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Our Noblest Deer

The American Elk or Wapiti

By VERNON BAILEY
Illustrations by R. Bruce Horsfall

"The stag at eve had drunk his fill
Where danced the moon on Monan's rill"

FAR FAMED in poetry, art and royal sport, the Old World stag is a splendid deer, well worthy of a Walter Scott or an Edwin Landseer. It is generically related to our American elk or wapiti, but is considerably smaller, with lighter antlers. Next to the moose our elk is the largest living deer in the whole world, and the adult bull in full prime with towering rack of antlers is truly a magnificent animal.

Only two centuries ago these great deer roamed in millions over prairies and plains, through the forests and over the mountains from the Atlantic to the Pacific, and from Canada almost if not quite to Mexico. Their numbers are now reduced to a few thousands in restricted areas of the far west. Their rapid reduction was inevitable for several reasons. They were needed to feed and clothe the explorers and pioneers who swept across the continent ahead of permanent settlements; they had little regard for fences and were fond of most of the crops raised by the farmer for his own use. They ate the grass needed for his cattle, horses and sheep, and would have eaten the haystacks left out over winter, had they not been nearly extirpated for meat before the rancher, with his cattle and crops, reached their range.

But for the beaver, the buffalo, the deer, and the elk our country would have been explored and settled much more slowly, and the United States might still have remained the original thirteen colonies, even if these had dared to cut loose from old ties. The debt we owe to the rich resources of the New World has never been fully appreciated nor has our use of the wealth here stored for ages been always wise. Much of it has been wasted or wantonly exploited for personal gain. Thousands of elk have been killed for their hides or merely for the two upper canine teeth to be sold as trinkets. Only in recent years have we as a nation begun to realize our responsibility in the conservation of native wild life, which is not, as it first seemed, inexhaustible. Now we must act quickly or it will be too late.

What a surprise it was to the early explorers to find in the forests of the New World "deer as big as horses" or "bigger than oxen", great herds of them, not so wild or timid as the small Virginia deer, easier to kill and better to eat. Some of the earliest records of elk were made in 1535, from eastern Canada near the present site of Montreal; from Virginia in 1650; from Carolina in 1731; from Pennsylvania in 1748. But their great numbers did not last long. As early as 1784 Pennant wrote that "elk are decreasing as population gains ground in the Colonies."

There were still a few elk in New York State in 1842, and in Pennsylvania the last one was killed in 1867. They were reported in West Virginia as late as 1847, but at that time they had disappeared from Kentucky. At that time it was said some still remained in Illinois, but no abundance of them short of far up the Missouri River.

My father killed his first and only elk in Tuscola County in southeastern Michigan in 1857, but when my people moved from Michigan to Minnesota in 1869 the elk had nearly disappeared from both states. We settled at Elk River, Minnesota, but then only a few old antlers were found in the woods where elk had been numerous a few years before.

In 1800 elk were abundant in the Dakotas (Dakota

Territory), but as these rich prairie states filled up with settlers during the next eighty years, the elk were killed off ahead of the settlements. Lewis and Clark, when wintering among the Mandan Indians on the Upper Missouri in 1804 and 1805, found elk meat a staple food of the natives for much of the winter, and Maximilian in 1833 and Audubon in 1843 found elk still plentiful in that general region. Roosevelt reported them abundant along the Little Missouri River up to 1881 "when the last of the big herds was slaughtered".

When I reached North Dakota in 1887 there were still a few scattered elk in the Turtle Mountains and a few along the timbered bottomlands of the Upper Missouri and the Yellowstone Rivers, but these did not last long. By 1893, on my next trip into Montana and Wyoming, most of those in the valleys and open country had been killed or driven back into the higher lands. From the mountains a few still wandered down the Yellowstone Valley as far as Billings and along the edges of the Big-horn, Wind River and Green River valleys to escape the deep snows of winter. But already the cattle and ranches were occupying the haylands and willow thickets in the bottoms of these mild and semiarid valleys.

Now this fertile valley land is fully occupied by ranches, and all of the forage is used for stock. Driven back from their former summer range, the elk have climbed higher and higher into the mountains, to protected areas—national parks, national forests, game refuges, even to wind-swept ridges above timberline—for their summer homes, while in winter many descend to foothill slopes and the higher and colder basins above the settlements. They were always migratory but now their migrations are blocked by settlements, and they are cut off from any suitable winter food supply.

The Indian with his bow and arrow had hunted elk for untold ages without depleting their numbers, but before the rifle of the white man they rapidly disappeared. Over most of the country they were slaughtered ahead of the advancing settlements from the Atlantic in 1535 to the Rocky Mountains in 1900. At the same time other herds of other varieties were being destroyed in the south and west. Now at least two of the well-marked subspecies, the eastern elk, *Cervus canadensis canadensis,* and the Arizona elk, *Cervus canadensis merriami,* are extinct, and two others, the tule elk, *Cervus canadensis nannodes* of California, and the Manitoba elk, *Cervus canadensis manitobensis,* have come close to the verge of extinction. The two remaining forms, the Olympic elk, *Cervus canadensis roosevelti* of the Pacific Coast Region, and the Rocky Mountain elk, *Cervus canadensis nelsoni,* still occupy a part of their original range in considerable numbers and can be permanently maintained if intelligently provided for.

"WITH WELL-POLISHED ANTLERS, TESTED ON MANY A ROUGH SAPLING" THE BUCK PREPARES FOR THE MATING SEASON

The old days of living on game are gone forever; the romantic glamor of invading the wilderness and living on what Nature provides is a thing of the past. Few of the pioneers of America are now living. We can well pause to look back at the thrilling past, and forward to try to visualize what the future will hold for those who come after us. If we plan wisely it may still hold much of the interest and charm of life that helped to carry our fathers across the continent and into every remote corner of the country.

In the management of any animals a thorough knowledge of their habits, dispositions, physical needs, diseases and relationship to man and other animals is necessary. Elk have been studied and

FIERCE ENCOUNTERS TAKE PLACE, AND THE VICTORS GAIN IN CONFIDENCE AND IN THE FAVOR OF THEIR FAIR FOLLOWERS

written about for three or four centuries in this country, but our naturalists are still learning important facts about our remaining herds, their seasonal food habits, their local migration routes and seasonal movements, and their fighting, breeding and mating customs. A large book could be written on their everyday and yearlong manners of life.

In summer, the chief business of a bull elk is raising a pair of huge antlers. With these, by sheer strength and courage, he fights his way to the head of a harem of ten or twenty or more cows, passing on his superior strength and courage to a few generations of elk calves and then giving place to younger and more powerful bulls in the prime of life. With well-polished antlers, tested on many a tough sapling, with heavily maned and swollen neck, the old bull in September bugles forth his challenge to all who dare to come and fight, to test their strength and skill and courage; and only those with equal courage reply to the challenge. Fierce encounters take place and the victors gain in confidence and in the favor of their fair followers as the vanquished ones are forced to their knees and then driven well out of the herd. No weaklings are allowed to pass on their characteristics to the coming generation, but another year the strength and courage of some of these vanquished bulls may pass the high test for victory. They will wait and in March will cast aside the old weapons of warfare and begin a pair of new antlers that will take much of their blood and energy through the long, idle summer. The choicest of foods are sought above timberline on the mountain heights: juicy clovers and lupines, tender young grasses and a host of flowering plants. Great snowbanks and sparkling rills help to cool the fever of their soft, velvet-coated, growing antlers, and help to keep away the tormenting insects of the lower levels. All fights and feuds are forgotten, as old and young bulls gather in friendly bands while the cows with lusty calves feed together in nearby flowery meadows. This is the happy, growing time of year, the season of safety, comfort and abundance.

But winter comes early on the peaks. September snows bury the low vegetation and start the elk herds downward, just as the early blizzards long ago on the Dakota prairies started them for the sheltering badlands along the river valleys. Halfway down the mountain sides they find green meadows again and pause for more feeding, but the spirit of autumn is in their blood. The hardened antlers are again polished, the fat cows take on a few more layers of fat against the cold and famine of winter, the five-months calves are getting most of their food by grazing, but some are still depending in part on their mother's milk, and much on her care and protection. Let a bear pass by and the mothers are all in front, ready to fight for their young or to lead a swift stampede.

Then, in early October, a snowy night comes to the timbered country and the bugling begins, a series of long quavering, roaring, or braying notes, well described as "bugling", but perhaps better by Maximilian's term of "flöting". It carries for a mile or more on the still air of night, and mixed with the squealing of the cows and barking of the calves of the herd all around one, it thrills to the very marrow.

After the mating season the November snows pile deep in the mountains and only the strong animals can dig down for food to the dry grass beneath or reach to the long cropped overhead browse. Then the real migration begins, and in single file, generally led by some old cow, the herd breaks a new trail above some very old one, down, down to lower levels and less snow, with the fond hope of more and better food. When the way was unobstructed by ranches and fences and the summer grass and browse had not been consumed by sheep and cattle and horses, the migration was (Continued on page 188)

MICHIGAN THANKS THE BIRDS
Described as "sparingly wild" in New England only sixty years ago, purple loosestrife, thanks to birds, now brings joy to Michigan residents

Westward Ho! for "Red Sally"

By LEAH STOCK HELMICK

TWENTY years ago, purple loosestrife, *Lythrum salicaria,* key flower for the great scientist, Charles Darwin, was unknown in Michigan. Roadside flowers were chiefly goldenrods, milkweed and Queen Anne's lace.

Today we see a miracle of Nature, for within those 20 years, loosestrife—the same "long purples" of which Ophelia wove fantastic garlands—has taken full possession of the countryside. Every marsh and pond-bank of the well-watered region between the great lakes, from Muskegon to Detroit, glows with a mid-summer show of rosy-purple spikes that in places cover thirty or forty acres. The dominant color of the season has changed from yellow to a warm magenta.

This newcomer to the Wolverine State also is comparatively new to America. Less than sixty years ago, Asa Gray described it as still "sparingly wild" in New England, where it first appeared. But its wealth of folk-names show its ancient familiarity to the writers and poets of Europe.

Such captions range from the unpleasant "dead man's fingers" and the descriptive "soldiers," "willow-herbs," and "rainbow-weed" to the charming "red Sally," suggested by the coquettish tilt of the rosy-cheeked blooms. A yellow variety quelled angry spirits, so ancients said, and sprigs were tied to ox-yokes to "loose the strife" of unruly animals.

The plant so variously named came to the New World by some unknown carrier and took root particularly well along the Hudson River and in the Wallkill Valley. Botanists say that its present migration is chargeable to birds. The seeds—so small that each host might be responsible for a thousand plants—are carried in bits of mud stuck to the feet. The species has apparently found another congenial habitat in marshy Michigan.

Not only has loosestrife added loveliness to the wayside, rivalling the snowy fruit blossoms of spring, but it has proved useful for civic planting and private gardens. It is also a desirable cut flower and, at a recent "Flower Show School," an extension project of Michigan State College, was employed by demonstrators in more than half of their arrangements, the only wildling among fifty cultivated flowers.

The new flower, which Darwin even grew in "clayey soil so dry that a rush cannot be found", may appropriately be seen in greatest beauty at the Arboretum of Hillsdale College, described by the ecologist, Professor Warren Waterman of Northwestern University, as "one of the two finest in the United States." Here, running along the shores of lagoon and bog gardens, loosestrife is

a warm central theme for an amphitheatre of bright flowers that scramble up rocky hills in all directions.

A more suitable keynote for such a laboratory could not be found, for loosestrife is the plant that led Darwin to some of his profoundest discoveries.

"I am almost stark, staring mad over *Lythrum,*" he wrote Asa Gray. "I believe it is a grand case of tri-morphism! I have tried every one of the eighteen pollinations possible. For the love of Heaven, examine your species and if you can get me some seed, do!"

The slight variations in *Lythrum* flowers had led earlier botanists to list them as three separate species. Darwin's excitement was due to his idea that the variations in the length of pistils and stamens were complementary arrangements for perfect pollination of one species. There are today only two known examples of such exquisitely adjusted functioning as "tri-morphism!"

Darwin proved his theory and made another great discovery—that loosestrife depended on insects for its propagation. This was the first absolute proof of this relation between insects and flowers.

"I can lay no claim to being a botanist," he wrote astonishingly in *Forms of Flowers.* Perhaps not! But his observations and deductions disclosed secrets of Nature never before known to man. He noted that, when reaching for nectar in the base of a loosestrife cup, an insect received a yellow dust on its face, a different pollen on its chest and green pollen on its abdomen. Why?

Eagerly he watched the bee enter a second form of loosestrife, and saw the pollen brushed off upon pistils that were of the same height as the anthers of the previous form. Was this an accident? His tests showed, on the contrary, that the arrangement bore witness to a divine providence. Only crossings at the same levels bore full and fruity seeds! "Illegitimate" fusions within a form or between opposite levels resulted in weak or sterile stock.

Pretty loosestrife, the first known tri-morphic flower and the first to betray its dependence on insects, led Darwin through a maze of absorbing and minute experiments and revelations that played a major part in his theory of the *Origin of Species.* It occupies many chapters of his monumental writings.

But, unmindful of such weighty matters and scientific problems, the cheerful "weed" winds its smiling way through the western world. Wherever birds fly and wet lands lie, "red Sally's" rainbow gleam may be expected.

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A SWIFT IN A GRANITE WALL

By ALBERT ERVIN THOMPSON

THE NESTING black swift pictured in the accompanying photograph was found on the nest near the western boundary of General Grant National Park in Fresno County, California, in the Transition Life Zone at an elevation of five thousand two hundred feet above sea level in the Sierra Nevada Mountains. The situation and the nest material used differ so much from those utilized by other members of the family that a brief description seems justified.

The narrow mountain gorge in which the nest was found is forested with tall sugar and yellow pines, white fir, incense cedar, and giant sequoia, and, because of a steep slope to the northwest, receives very little direct sunlight except during a brief portion of the afternoon. At other times only random shafts of light find their way among the trees.

The nest was built in a hollow of a granite wall, sheltered by an overhanging projection of rock. It was about six feet above the bed of a mountain brook and not more than twelve feet removed from a rushing cascade that boiled down a chute from a cliff above. Because of the smoothness of the sheer face of the rock, the situation was inaccessible to snakes and small mammals. The nest was formed by moist mossy material, imbedded in a natural

THE BLACK SWIFT AT HOME
The bird built her nest only twelve feet from a rushing waterfall that tumbled over the cliff from above

growth of the same plant. Seeping water and spray from the waterfall kept the site continually moist. For this reason the nest was at first mistaken for that of a water ousel. One egg was laid, but after it hatched the young bird mysteriously disappeared, perhaps devoured by an enemy.

The parent bird was brave and hard to flush, becoming quite used to the camera, but whenever it did leave the nest, it dropped quickly out of sight past the willows of the stream without uttering a sound, and would not return while visitors were present.

The picture was taken in the latter part of June, 1936. The incubation period of the egg could not be determined, as it was almost ready to hatch when first discovered.

". . . FLYING LOW OVER THE MARSH WITH NECKS EXTENDED . . ."

As is characteristic of all birds in climbing flight, the whooping cranes, as this excellent photograph shows, use their wings to the utmost. Note how they fly with their necks thrust forward, in contradistinction to the herons, which fly with their necks folded against their breasts.

A Trumpeter of the Marshlands

Standing almost as tall as a man, the stately whooping crane, exploited for more than a century by collectors and hunters, today probably faces extinction

By ALBERT DIXON SIMMONS

Photograph by the author

NATURE painted the plumage of the ptarmigan, the grouse of the moss-covered tundras, with a summer coat of russet-brown that blended perfectly with its surroundings, and a winter coat as white as the snowdrifts. But when she created the whooping crane, *Grus americana,* she left it with many handicaps. She gave it a trumpet-like voice that can be heard for miles; a deep resonant "w-h-o-o-p" that passes through fully fifty inches of windpipe that is coiled at one end within its breast like the tube of a bugle. She created the tallest and most stately of our North American birds, and she made it all white. Then she stroked its partially bald head with her carmine brush and added jet black wing tips.

Driven to the uninhabited prairies and marshes, harassed through more than a hundred years by collectors and gunners, these rare birds, once legion, now are reduced to a handful that seems to be marked for extinction.

I had wanted to make photographic records of the flight of blue and snow geese at their winter home in the huge marshes bordering on the Gulf of Mexico. It was in this country that Audubon observed the fall migration of whooping cranes and noted in his diary (1840): "Reader, see this majestic bird shake its feathers and again arrange them in order. Proud of its beautiful form, and prouder still of its power of flight, it stalks over the withering grasses with all the majesty of a gallant chief".

It was here also, almost one hundred years later, that I was to see and photograph these rare birds. I had left camp at daylight, and winding through the bayous at seventeen knots per hour, my thoughts were with Audubon as he labored here on foot or perhaps poled his pirogue slowly along. A colorful sunrise with nothing but a low narrow fringe of seabrake and mangrove to hide its full beauty, gave promise of a fair day. When I passed through a fresh water lake, thousands of Canada geese took to the air with much honking. A flock of canvas-backs on the water, their backs sparkling in the early morning sun, resembled so many tiny white sails.

And then I saw them! Out on the marsh fully a mile away, their snow-white bodies marked them without the aid of glasses, and their deep trumpet calls easily carried across the distance. Stalking them, even helped by abundant cover, is difficult, because the whooping crane, when on the alert and stretched to its full height, stands five feet high, a natural advantage which enables it to see approaching danger from afar.

Here were two of the rare birds surrounded by nothing but the bare marshland. In open country the sign of movement is lessened by a "beeline" approach, and this was my only choice. The marsh, undermined by muskrats, made each step a problem. As I went into a slight swale in the marsh, I lost my bearings and was guided only by the whooping of the birds. Here again I was further confused by hearing the calls coming from two directions. As I slowly progressed, a group of six more cranes came into view. These birds were down wind, which gave hope that when they took off they might circle up wind and thus present an opportunity of photographing them on the wing.

At a distance of half a mile the cranes were well alarmed. Occasionally one or more of the birds would take to the air, but after a short circling flight, would land again with spindly legs outstretched to meet the ground. Through glasses, I noted the wing beats by stop watch—two per second. Before taking flight they spread their huge wings, then with a quick hop and a smart flip of the wings, were off the ground with neck and feet bobbing at each wing beat. The wing action was short and snappy in that the wing tips travelled through a small arc as compared with, for instance, the loping wings of the great blue heron.

When I was about two hundred yards from the birds, three of them took off, and circling up wind to gain elevation, passed within twenty-five yards of me. The thrill and excitement of the moment will be a lifetime remembrance. The chance to see and photograph the rarest birds on the continent had arrived. The air for the moment was filled with almost deafening trumpet calls. As they passed me one bird was lagging, and I "shot" the two. Then they were gone, flying low over the marsh with necks extended, long black legs thrust straight to the rear, and snow white wings flickering as they were alternately thrown into light and shadow. Although they quickly passed from my vision, their vibrant calls and the memory of this experience will remain with me always.

Here are six of Mr. Clepper's ten most important trees. Reading vertically, they are the coconut palm, a native of the Malay Archipelago; the almond tree, a member of the rose family that first grew in western Asia and in the Mediterranean region; the rubber tree of a South American plantation, from which come the numerous rubber products of commerce; the familiar apple tree, one of the leading fruits of the world; the date palm, known to have been in cultivation for more than 4000 years and for centuries the chief source of wealth in the Arabian peninsula; and the olive tree, undoubtedly cultivated by the ancient Egyptians

U. S. DEPARTMENT OF AGRICULTURE PHOTOGRAPHS

According to HENRY CLEPPER:

THESE TEN TREES

are the most important in all the world

NAMING the ten most important trees in the world is similar to naming the ten best books or the ten greatest men. It is apt to arouse a great deal of controversy. Foresters, botanists and naturalists generally cannot be expected to accept any such classification of trees, but the writer, after some years of study, herewith submits his list of the ten most important for the reader's agreement or violent disagreement, as the case may be.

First, however, a word as to prerequisites for a place on the list. To win a place, a species had to fall within several definite categories of usefulness. To begin with, it had to be of great importance to man. Second, it had to be in extensive use for a long period of time; for at least one thousand years. (One exception to this rule was allowed, as will be noted later.) Third, it had to be a species that, if suddenly taken from the face of the earth, could not readily be replaced by any other.

The author submits the following list as the ten most important trees in the world. Do you agree?

1. The date palm
2. The coconut palm
3. The almond tree
4. The apple tree
5. The fig tree
6. The mulberry tree
7. The olive tree
8. The lemon tree
9. The cinchona tree
10. The rubber tree

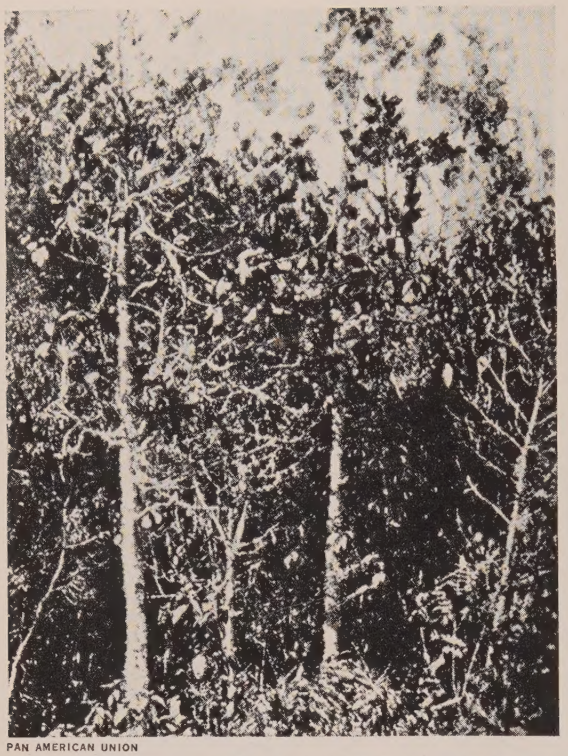
Such records of antiquity as have come down to us reveal that many species of trees have been cultivated by man for food and other purposes since before the dawn of human history. Consequently, among the most useful are those that provide food, particularly food in the form of fruit.

Unquestionably then, the foremost families of trees are the palms. And first in importance, and number one on the list, because of its long use by millions of people throughout the world, is the date palm, *Phoenix dactylifera.* This tree is known to have been in cultivation for more than 4000 years. It supplies the date of commerce, oil, wood, and fibre. The palm mentioned in the Bible for centuries has been the chief source of wealth in the Arabian peninsula. Its ancient cultivation is mentioned by Herodotus, the historian of ancient Greece who is known as "the father of history". First grown in Egypt and Babylonia, it is cultivated also in northern Africa, France, Italy, and China.

Number two, the coconut palm, *Cocos nucifera,* originated in the Malay Archipelago and has been cultivated for at least 3000 years; first in the East Indies and now along most of the tropical coasts of the world. It has been established in Florida, and is extensively grown in India, the West Indies, and Brazil. A valuable food plant in the Pacific Islands, its chief products are the coconut and its kernel, which when dried produces copra, a product valuable in the manufacture of commercial fertilizers. Palm wine and sugar are made from the juice, and fibre for cordage is manufactured from the stems. Two other palms have been of great economic importance to the peoples of tropical and subtropical lands. They are the oil palm and the areca nut palm, but should not be confused with the two previously mentioned. The palm for palms must go to the first two.

A CALIFORNIA LEMON GROVE

The lemon tree is in eighth position on the author's list. It originated in India and has been in cultivation for about 2500 years, and is now in world-wide use. The lime, a relative, is important but less popular than the lemon



PAN AMERICAN UNION

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THE CINCHONA AND THE FIG TREE RANK IN THE "FIRST TEN"

The cinchona of Peru and Bolivia is the source of quinine, one of the most important drugs in medicine; and the fig tree, in the United States grown in the Gulf States and in California, is the source of our dried figs. The cultivation of the fig dates back to 700 B. C.

Number three is the almond, *Prunus communis.* This small tree is a member of the rose family. It probably originated in western Asia and the Mediterranean region. The almond tree is mentioned in the works of Theophrastus, a Greek philosopher and naturalist of the third century B. C., who wrote a history of plants. Although almonds are produced within the United States, more than one million dollars' worth is imported annually.

Number four is the apple tree, *Pyrus malus.* It produces one of the leading fruits of the world; it is the most important in North America and probably in the entire north temperate zone. Plant researches indicate that the apple originated in southern Europe and Asia Minor. In prehistoric times it was known and used by the Lake Dwellers of Italy and Switzerland about ten or fifteen thousand years ago during the New Stone Age.

U. S. FOREST SERVICE

Number five is the fig tree, *Ficus carica,* which grew originally in southern Asia and Europe, whence it has been introduced into other sub-tropical lands. In America, the fig is grown in the Gulf States and in California, and is the source of the dried figs of commerce. The cultivation of the fig is mentioned in the writings of Archilochus, a Grecian poet, about 700 B. C.

Number six is the white mulberry, *Morus alba.* It is native to India and Mongolia, and it has been grown in China since ancient times for its leaves, the chief food of the silkworm. The bark was once widely used in paper making. The white mulberry has been grown in America since 1830.

Number seven is the olive tree, *Olea europea.* It is mentioned prominently in Homer's *Odyssey* (about 1000 B. C.), and in old Hebrew writings, and was without doubt cultivated by the ancient Egyptians. Its chief products are its fruit and the oil of the fruit. Once of great economic importance only in dry countries, the olive is now extensively grown in Mediterranean Europe, Syria, South Africa, and Australia. Culture of the olive in America is largely confined to California.

Number eight is the lemon tree, *Citrus limonia.* Originating in India, the lemon has been cultivated for some 2500 years, and is now in world-wide use. It thrives in tropical and sub-tropical lands, and in the United States,

A SILK WORM'S PARADISE

The white mulberry, a native of India and Mongolia, has been grown in America since 1830, and in China since ancient times for its leaves, the chief food of the silkworm

chiefly in Florida and California. The lime, a variety of the lemon, was also anciently cultivated in India. It, too, is an important fruit, but less popular than the lemon.

Number nine is the cinchona tree, *Cinchona calisaya,* of Peru and Bolivia, the source of quinine, one of the important drugs in medicine. Cultivation has been increasing ever since the bark of the tree was introduced into Europe in 1639.

Number ten is the rubber tree, *Hevea brasiliensis.* Although under cultivation for less than 100 years, and extensively grown for less than 40 years, the rubber tree is among the most important in our present civilization. From it, as everyone knows, comes the juice that, when hardened, yields all the numerous rubber products of commerce. The trees are grown in Mexico, South America, Africa, and the East Indies. It would probably be no exaggeration to say that, of all the trees mentioned as being used by man since prehistoric times, the rubber tree, though the latest to be cultivated, is the one which he could least afford to give up.

Although these ten trees are listed as the world's most important, it is realized that others have claims nearly as great. The cherry, for example, one of the world's leading fruits, has been in cultivation almost as long as the lemon tree. The orange, though one of the most popular of American fruits, has been cultivated for a relatively short period of time. It was not developed until the Middle Ages, and was quite unknown to the ancient Greeks and Romans.

The cocoa tree supplies cocoa, chocolate, and cocoa butter, but it is not of world-wide importance. The coffee tree has been cultivated for only about 500 years; and though the bean is used extensively it is probably less generally used than tea. Among other important species are the apricot, peach, pear, pomegranate, quince, mango, and clove. None of these, however, deserve a place on the list of the "ten most important".

It will be noted that the list fails to mention the great lumber producing trees of the world. The chief reason for this omission is because few of them actually have been cultivated for their wood alone, and, furthermore, none is of such outstanding importance that its products cannot be duplicated by other species. The redwoods and big trees, for example, are unique in size and grandeur, but they are not of exceptional economic importance. Similarly, the cedars of Lebanon are unique in historical interest, but not otherwise remarkable.

In short, the supreme test of a tree's importance is the use mankind has made of it and his need of it. The writer has named his list of ten. Now, you name yours.

An Example Worth Following

How an individual can help to protect birds is well illustrated by the example of Miss Lena Hutchins of Bath, N. H., for 15 years a music teacher in Rock Island, Illinois, and for equally as long a time a busy music teacher in Bath and Woodsville. Miss Hutchins declares a recess for two days in every week for the purpose of devoting her time to the many birds that make the immediate vicinity of the stone house, which she occupies alone, their habitat. For three years Miss Hutchins has fed the birds, and the chickadees remain around her residence throughout the seasons. Every morning at eight o'clock the little band awaits her call, "Come, Chickadee". During the winter months, when the ground is covered with snow, they are hungry and will not hesitate to fly to her windows and rap for attention, if they have been neglected at the usual time. She feeds them suet regularly, but they prefer doughnuts. Only one at a time ever rests on the doughnut held in her mouth, but as many as five chickadees have rested on her person awaiting a turn at it. Miss Hutchins was scratched on the chin once when she had only a piece of a doughnut in her mouth, and another time one pecked at her eyebrows. She has since kept her eyes closed when feeding the birds in this manner. They always seem hungry and sometimes fly in the direction of her mouth, whether or not a doughnut is there.

Miss Hutchins, who has always been a great admirer of all species of birds, feeds the humming birds during the summer months by holding flowers in her hands.

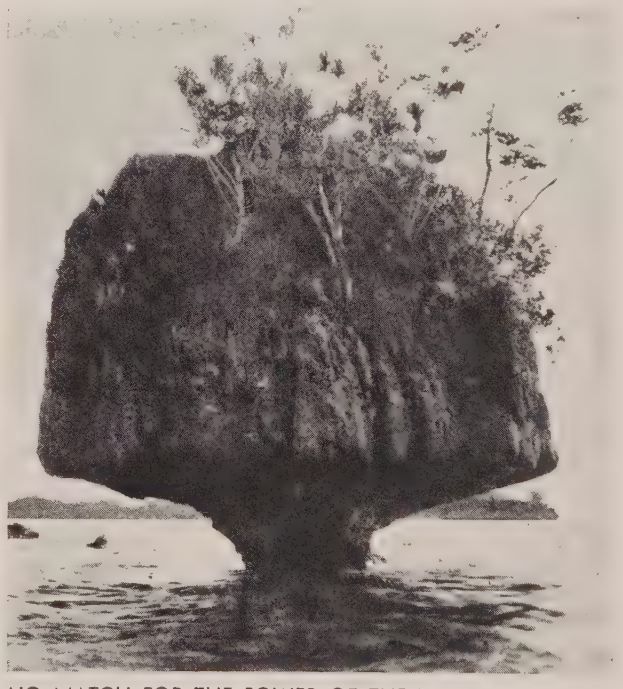
OUR UNSTABLE SHORES

By ELLIOTT ROBERTS

THE SEAS do not like their living quarters. So they build up, tear down, and rearrange their beds. All of which adds to the labor of man, self-appointed recorder of the changing movements of the sea and their effect on the contour of the land.

The earliest explorers of our shores knew nothing of the deeps and shoals; they were blind men groping in a strange house. The situation is now remedied by charts of our oceans and coastal waters, so that great ships steam confidently where the first comers had to sound their cautious way. Still, we are forever confronted with the sea's restless changes—deepening here, shoaling there—and the advance or recession of the shoreline on many a mile of coast. The chartmakers must be forever alert to the latest changes, to keep the charts accurate.

A surveyor, busy on the coast of South Carolina, stood by his instrument on the sandy beach, just out of reach of the breaking waves. He calculated the location of the station where he stood, and was about to put it down on the chart, when he blinked. What had he found? He checked his work, and it was correct. According to the old chart his station lay in water many feet deep, half a mile from the nearest dry land! High time he was there, checking old man ocean's latest vagary!



NO MATCH FOR THE POWER OF THE WAVES

The constant hammering of the waves can wear away the hardest rock. Undermined by the ceaseless pounding, this islet must soon fall into the sea

The United States Coast and Geodetic Survey, chartmakers for the United States, maintains eternal vigilance to keep abreast of all the changes that occur, especially on the more unstable and shifting portions of our coast. In many of these thousands of miles of shoreline, even a few years will see enormous changes. The point of Rockaway Beach, opposite New York Harbor, grows westward some 250 feet yearly, a matter of several miles in a lifetime. Long Beach, Coney Island and Sandy Hook are all extending themselves toward the channel.

Not long ago a party of the Coast and Geodetic Survey surveyed a new channel leading to a Florida port. It was newly-dredged, and they found almost exactly the depths specified in the construction contracts. There were certain conditions, obvious to the experts of the survey party, that indicated the possibility of future changes in the depth of the channel. A few months later, as a matter of verification, they revisited the place, and found the channel six feet or more shallower than on their first sounding. Immediately the port authorities ordered further dredging operations. The chartmaker, in the face of changes such as these, must be ever active if his charts are to merit the navigator's confidence.

Mariners, unable to see the sea-bed beneath their ships, must guide themselves largely by bearings on natural or artificial landmarks ashore. There, on dry land, one might assume that the natural landmarks do not change. The chartmakers have found, however, that nothing can be taken for granted. In a navigable inland bay in Florida they recently discovered a group of wooded islands, "grown" out of the water close by a well-travelled route for vessels. They had appeared in a place shown by previous surveys to be clear, unbroken water. Did not the surveyors keep abreast of such changes, the navigator, searching the charts to identify the surrounding visible land, soon would be confused and helpless.

These changes are not all concerned with remote and unimportant places. Fishing Point, on the Virginia coast, grew southward some three miles within fifty years, converting an area of exposed water into a sheltered place. It eventually formed a natural harbor of refuge, and now is sought by fishing craft in times of storm. That was a happy occurrence, and the chartmakers kept track of the changes, repeatedly producing new charts of the area. A strange thing about this natural phenomenon is that the point has by now grown so near the opposite beach as to threaten a complete juncture, closing the little harbor that has been so valuable to fishermen. It is probable that in the course of centuries this cycle will be repeated many times.

Similar changes are taking place, in unseen ways, along the sands of the ocean bottom miles from land. Shoals and bars will wash away under certain conditions of wave and current, only to build up again when the elements change their line of attack. Many shoals are under-water sand dunes, rolling along under the persistent attack of the water. The particles of sand are washed up on the

seaward side till they fall over the crest and go tumbling down again. This results in a slow but definite displacement of the whole shoal. Resurveys will sometimes show whole groups of shoals, like desert dunes, travelling apace in one direction.

Recent advances in the art of marine surveying have done much to make the work more rapid and efficient. We can now keep really up-to-date in our knowledge of the seas. Thanks to the fathometer, one of the most remarkable of the instruments of modern navigation, continuous depth readings are made while the ship steams along her course. A tremendous amount of comprehensive reconnaissance can be performed without undue expenditure of time. The survey ships turn out their charts in far shorter time than formerly, when all soundings were "leadline casts" from ships whose speed had to be reduced to nearly zero. For the correct placing of the soundings on the chart the surveyor no longer has to see his signal beacons along the shore. He measures hundreds of miles by timing the passage of sound signals through the water, carrying his positions with accuracy into remote regions, even in fog or the darkness of night.

The surveyor no longer plods laboriously through the coastal swamps and thickets to make his measurements. He has the system called "air photo-topography", basing his charts and maps on photographs taken vertically from airplanes in flight. The precision demanded by the charts is attained by an accurate, though rapid ground survey to fix the exact locations of certain objects visible in the photographs. A few hours of flight will afford thousands of pictures, each containing a wealth of land detail that could formerly have been plotted only after years of labor.

We seek, not only to portray, but to control and direct the forces of the sea. Fortunes have been spent, many of them fruitlessly, in efforts to safeguard waterfront property. In time, however, perfection in this direction will certainly be approached. Just as medicine, chemistry and the other scientific arts have approached more nearly to the ultimate goal—domination over the forces of Nature—so will this science, dealing with what are perhaps the greatest forces in the world, approach perfection.

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Variety Among the Evergreens

By VICTOR H. RIES

VARIETY, THE SPICE OF GARDEN DECORATION

Artistic effects can be obtained by planting broad-leaved evergreens with conifers

EVERGREEN plantings need not be so sombre if you combine some of the broad-leaved evergreens with the conifers. The variety of foliage effect, the difference in habit of growth thus obtained, not only relieves the monotony but gives a delightful and artistic effect. Although any of a number of different broad-leaf evergreens may be used, an outstanding one is the firethorn, *Pyracantha.* Closely related to the hawthorn, it might even be called an evergreen hawthorn, for its sharp spines and orange-red berries somewhat resemble the thorn-apples.

Like the hawthorns, they are best planted in the spring. Since they are a little difficult to transplant, they should be handled in the small size, preferably not over 2 feet high, with solid balls of earth held in place by burlap. Some nurserymen prefer to sell them as pot plants in four, six or eight-inch clay pots. As the shrubs are relatively quick growing, these potted ones are quite satisfactory.

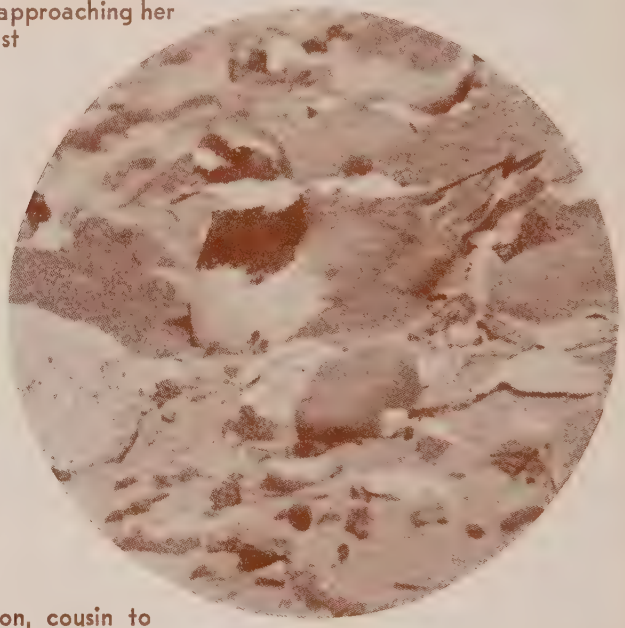
The firethorn grows in sun or partial shade and in either alkaline or acid soil. They are of vigorous growth but, if space is restricted, they can be kept within bounds by early spring pruning or by root pruning. This is accomplished by cutting the roots with a tilling spade even with the tips of the branches every spring or two, depending on the vigor.

Since hardiness is desirable, it is advisable to buy your plants from a nursery in your own latitude. Although they stand temperatures as low as ten to twenty below, it is best not to plant them in places exposed to cold winds.

It is difficult to recommend definite varieties since the firethorns are badly mixed. Nine times out of ten you will get *Pyracantha coccinea lalandi,* which is satisfactory. *Pyracantha crenulata rogersiana* and *P. gibbsii* are claimed by some to be hardier and of better habit. For fruiting it is best to plant in groups of two or more.

A British oyster-catcher, locally called a seapie, approaching her nest

The lapwing's crest trembles slightly as a light breeze blows across the sand



A ring plover brooding her eggs on a shingle patch among the dunes

The gray heron, cousin to our great blue, returns to her nest atop a pine

SOME BIRDS OF BRITAIN

By L. J. LANGFORD

In Britain, particularly in the southwest, we have many hanging woods—woods that run down the slope of a hill into the valley. I remember one of tall stately beeches and spreading oaks on the border of England and Wales. It was reputed to be a remnant of the original forest of Britain, yet it was cut down during the war to provide timber. A broad path wandered between the trees for a mile or so, and on either side of the path wild daffodils in profusion nodded in the April winds. The tops of the lower trees, crowded with rooks' nests, were on a level with the eyes of anyone walking along the ridge. As one appeared in view, the colony of perhaps two hundred birds rose to circle overhead. As the clamor of the sudden alarm died down, one could watch the birds as they returned to their nests.

The rooks that were building or repairing nests flew to other trees outside the rookery to wrench off long supple twigs. Usually, one bird of a pair remained at the nest, as in the absence of both owners their neighbors would steal all the sticks that had been placed in position. A year or so later, observations were continued from a blind, which was erected in January before any of the colony had returned. It was built into a convenient fork in the topmost branches to resemble, so far as possible, one of those huge collections of four or five nests that are a feature of most rookeries. Five frames, four feet square, were constructed on the ground from hazel rods and beech twigs. These, when completed, resembled the hurdles used to protect young lambs in a sheepfold. Four of the frames were hauled into position in the tree to form the sides of the blind, and the fifth made the roof. The interior was lined with green fabric fastened at many points to minimise the flapping of the material in the wind, a frequent cause of alarm to returning birds.

The camouflage was successful. When the birds returned, so little notice was taken of the structure that two nests within eighteen inches of the blind were occupied immediately. Later a pair of birds commenced to build a nest on the frame that formed the roof. By the third week in March the blind was surrounded by twelve nests, all in the same tree, some of the birds having full clutches of from three to six eggs. At this time the weather became very stormy for a few days, the wind reaching gale force at times. Several nests were blown from the trees, but at once the birds from these began building again.

The success attending this effort induced me to try the the method on other species of tree-nesting birds from time to time. The photograph of our large hawk, commonly called the buzzard, feeding her young was obtained from a blind well covered with bracken and foliage in a wood in Central Wales. The hillside sloped sharply enough to permit of this structure being built on the ground thirty-five feet from the nest in the main fork of an ash. Fortunately, many of the leaves on the surrounding trees had been eaten by caterpillars, so that the light was fairly good. On the first day, the first of July, I was in position in the blind by 11 a.m. A friend from a nearby farm had seen me into it and had rearranged the covering of foliage before departing from the tent, which had been in position for three days. One bird alighted in the tree for a few seconds in the early afternoon and searchingly inspected the blind before flying off quietly. The buzzard's flight is almost noiseless, being in this respect much like that of the barn owl.

A REMARKABLE PHOTOGRAPH

This picture, made by flashlight by E. J. Hosking of London, shows a barn owl leaving its nesting chamber in a hollow tree. The author believes this to be the outstanding British Nature picture of the year 1936

Next day I was again in position by 11 a.m., the camouflage rearranged before my friendly farmer departed from the scene. Should 11 a.m. seem rather late in the morning to commence observation, I may explain that I had to motor several miles, and at the end of the journey climb to an altitude of two thousand feet from the river-level in the valley below. It was not an uncommon experience to have to empty the radiator of boiling water and to refill it from a mountain brook which crossed the loose-surfaced road at the half way line. On a stormy

A buzzard, *Buteo buteo,* photographed while plucking a rabbit for her young

A green woodpecker poses momentarily before entering her nest to feed her young

day, it was next to impossible to make the journey at all.

The female hawk returned to the nest at 1:15, carrying in her talons a young rabbit, which she began to pluck immediately, pieces of the fur floating away in the wind and adhering to the lichen-covered bark. She tore the exposed flesh to feed the two young very carefully and tenderly for thirty-five minutes, giving the young all the tit-bits and eating the skin and coarser portions herself. During this visit, three exposures were made without disturbing her in any way, the shutter being allowed to close gently after exposures of one-half to one secor She returned again at 4:50, feeding the young for h an hour. The young did not fight nearly so much in h absence as they had the day before. As the young a hatched at intervals of two or three days, the older chi was considerably stronger than the other, and it is fairly common experience to find that only the first youn ster survives, the weaker one being pecked to death the stronger during the first ten days.

The nest of the gray heron was built in the top of

Her nest completed, Mrs. Rook surveys the site where soon she will bring her offspring into the world

pine growing on the Mendips, which commanded a magnificent view over West Somerset to the Bristol Channel. The blind, a duplicate of that built for the rooks, was placed piece by piece in the top of an ash that overlooked the pine, nest and blind being twenty-one feet apart. Three other nests could be photographed from the blind, and as at least one of the eight adult birds was always at the nest, sessions in this tree top were never dull. The easternmost nest contained two well-grown young, and the adult birds, a beautiful pair, would remain at the nest after feeding for an hour or more, resting or preening their plumage. The feeding is an exciting business resembling a "rugger" scrummage. A mass of partly digested eels and other small fish is disgorged into the bottom of the nest by the adult a few minutes after its arrival from the fishing grounds.

Apart from the quick movements of the young as they struggle and flap their growing wings, there is, even on a fine day, considerable movement of the upper branches of the trees so that for perhaps an hour or so on end serious photography is out of the question, and the observer merely watches as he waits for the breeze to moderate. This remark is not meant to indicate that there is no interest in watching, because often I have been so fascinated by some bird action new to me that I have forgotten to press the antinous release in my fingers to expose a plate already in position.

A pair of green woodpeckers had bored a nesting chamber in the bole of a small ash tree that grew in a little hollow in a large meadow in Somersetshire. The boring was only about six feet from the ground, and telltale chips and wood dust were quite conspicuous at the foot of the tree. As there were cattle in the field, the blind could not be left in position for a very long time to allow the birds to become accustomed to its presence. It was therefore erected in the late evening, and by eleven o'clock the next morning the sun had moved around sufficiently to permit exposures to be made as the birds returned to feed the young, which now could be heard making curious hissing noises within the cavity.

The usual surprises and disappointments soon came. The male flew to the trunk and attempted to play hide and seek with the camera lens, putting the trunk between himself and the staring eye and peering around the tree as he regained confidence. As he moved round to my side of the trunk in a series of climbing jerks, I saw that he had lost his tail. When he had given me my first exposure and had fed the young, the farmer came to see what manner of thing had invaded his field. His behavior was humorously similar to the woodpecker's. He walked carefully round the tree and blind before I startled him just a little by what was intended to be a pleasant "good morning". He countered immediately, however, by wanting to know if "this contraption was some of Mr. Tuckett's machinery", mentioning the friend who had been kind enough to introduce me to these birds.

As soon as the farmer had departed, the female woodpecker returned to the tree, clinging to the bark and resting on the stiff feathers of her tail. At one time both birds were on the tree at the same time, though unfortunately not close enough together to permit both being portrayed on one plate. It is usual for one bird to wait until its mate has left the nesting chamber before taking its turn to feed the young.

On the western coastline of Glamorgan, there is an area of perhaps forty-five square miles of sand dunes that resembles in many ways a miniature desert. Here, near the end of the seventeenth century, the sand was blown inland in a great storm and covered completely three villages; the top of Kenfig Castle protrudes from the sand some three miles from the sea. Interposed with large expanses of shingle between the ever-shifting hills of sand are shallow lakes surrounded by dark-green fringes of dwarf willows and rushes, the home of the sea-pie, lapwing, ring plover, redshank, sheld-duck, teal and mallard.

The sea-pie or oyster-catcher is a large handsome black and white bird with vivid red beak and legs. It lays its two or three boldly blotched eggs in a hollow scratched out in the shingle. The eggs harmonise so well with stones of similar size that it is not easy to find them. Where the shingle is more sand than stones, one may find nests of this species and of the ring plover on a still day by following the imprints of the birds' feet as they walk to the nest. A breeze soon fills in the tiny hollows of the birds' steps. Indeed, the sand is always moving, and on the wider expanses of dune it is patterned by the wind to resemble the waves of the sea.

The lapwings nest either on the sand dunes amongst the sparse marram grass or more frequently in the patches of dwarf willow and rushes. Their handsome eggs, usually four in number, are arranged always with the small ends together, otherwise the bird could not cover them when incubating. Formerly these eggs were esteemed a great delicacy and were collected for the market. The bird and its eggs are now strictly protected and the bird is increasing in numbers. It is a valuable friend of the farmer.

Recently, improvements in flashlight apparatus have permitted photographs of nocturnal birds, such as the owls, and also those that nest in caves, barns or dark places, such as the swallows, to be obtained. My friend, E. J. Hosking, has kindly allowed me to use his remarkable photograph of a barn owl leaving its nesting chamber in a hollow tree. It is no exaggeration to say that this is the most remarkable British Nature photograph of the year 1936.

OWL

By ELEANOR ALLETTA CHAFFEE

His ribald laughter split the night in two;
Shook from a bough a note that no man hears
Without a shudder trembling in his pulse,
And strange ghosts muttering witch-talk in his ears.

MARSHLAND DWELLERS

By LEWIS WAYNE WALKER

FROM out of the mass of cat-tails, bullrushes, and other tall reeds come many interesting sounds. In spring there sometimes can be heard a mysterious pumping, yet it comes from a swamp in which you know there are no human inhabitants. If you slowly slip up to the source of this noise and are successful in finding its maker, you have found one of the most interesting of the feathered folk—an American bittern. It is almost of the same form as the great blue heron, but is somewhat smaller and of stockier build. The bill is like a javelin, long and sharply pointed. In the bird's ordinary routine this is used by its owner to spear frogs, mice and small fish, but when the bird is wounded it is used for defence—often against man, the bittern's worst enemy. The muscles of the neck are strong and powerful, and the beak is usually launched with unerring aim. If you meet one of these birds in the bullrushes, it is well to keep several feet away, or the results of the encounter may be disastrous.

Sometimes there is seen flitting over the marshland at twilight a phantom form dressed in brown—the short-eared owl. Perhaps when you are wandering around you will come upon this bird's nest. It is not placed in the trees, as are the nests of most other birds, but is situated on the ground hidden among the heavy growths of weeds. This bird's eggs are white and nearly round. When the young are first hatched they are clothed in a soft down, similar to that of a baby chick. Lying about the nest will be many pellets, the cast-off refuse of the owl's past meals. I examined forty-four of these disgorged pellets and found that they contained the remains of sixty-six rodents, and only three birds. The sixty-six rodents, had they lived, would have destroyed many more birds than the owl did, as they continually rob birds' nests of the eggs and young, and sometimes even get the parent birds.

VALUABLE RODENT HUNTERS

The marsh hawk, and the short-eared owl pictured below, do much more good in keeping the rodent army in check than they do harm in catching birds

Another marshland dweller is the marsh hawk. He may be easily identified by the white patch on his rump, and the upturned ends of his wings. Like the short-eared owl, he also is often killed needlessly, for the good he does in catching rodents far outweighs the little harm he does in catching birds. The father bird of this species is a light gray color, but the mother and all the young under a year old are reddish-brown. A member of the United States Biological Survey made a study of the bob-whites in Georgia. He found that the marsh hawk occasionally ate this game bird. To the ordinary thinker this would mean: "Kill the marsh hawk," but the investigator looked into the other food items of the hawk, and found that cotton rats made up about 75 percent of it. During the breeding season of the bob-whites the cotton rats eat many of their eggs and young. In this way it was discovered that, while the hawk may be an enemy to an occasional individual bird, to the race or species he is a valuable benefactor because he destroys their worst enemy.

In the spring of the year there can often be heard from the marshes a pleasing rapid warble. On closer investigation it will be found to come from a diminutive bird, the marsh wren. As a rule he utters this melodious note while on the wing and seems to be fairly bubbling over with joy and happiness. A knock at the front door of his roofed-over home, or a call on any of these marshland dwellers will well repay your efforts.

Peyote and the American Indian

By RICHARD EVANS SCHULTES

Photographs by the Author

WHEN the Spaniards came to Mexico, they found, among other sacred plants, a small, narcotic cactus that was worshipped by the natives. In spite of four centuries of civil and religious opposition, the worship of this "divine" plant—peyote—has not died out in Mexico. Moreover, circumstances attendant upon the spread of white man's culture throughout North America have made it possible for the peyote-religion of Mexico to diffuse, in a modified form, to more than thirty Indian tribes of the United States.

PEYOTE IS A CACTUS

It is a small, grayish-green spineless variety used as a religious sacrament by several American Indian tribes

Peyote, *Lophophora williamsii,* the central figure in this "new" Indian religion, is a small, grayish green, spineless cactus. It is found growing on both banks of the Rio Grande and in Mexico as far south as Hidalgo. It is rather insignificant in appearance; the greater part of the plant consists of the root. Its small, globular crown is divided into from seven to thirteen ribs, straight or spiralled, on which are borne areoles with tufts of silky hair. The pink flower opens in a depression in the top of the crown.

The crowns, cut off and dried, form small discs called "mescal buttons". It is in this form that the narcotic is eaten for the intoxication that results. Peyote contains from four to seven remarkable alkaloids, one of which is capable of causing colored hallucinations. With eyes closed, the fortunate worshipper may, for hours, enjoy a kaleidoscopic play of the most indescribably beautiful visions of geometric figures and familiar things on a background of constantly changing colors, so exquisitely rich as to seem supernatural.

It is easy to understand, then, how such a powerful plant could be regarded as a "messenger" capable of putting the individual in communication with the gods without the medium of a priest, for peyote is believed to perform such a function by members of the cult. The Huichol of Mexico consider peyote the incarnation of a god; the Tarahumare hold that when Father Sun left earth to dwell above, he put peyote here to cure mankind's ills. "Hikuli (peyote) is not as great as Father Sun, but sits next to him."

Havelock Ellis gives the following description of the visions that came to him while under the influence of peyote: "Every color and tone conceivable to me appeared at some time or another. . . . At first there was merely a vague play of light and shade which suggested pictures, but never made them. Then the pictures became more definite, but too confused and crowded to be described, be-

A PEYOTE ALTAR

The altar, the crescent-shaped affair in the center, is seen just as used during the nocturnal ceremonies. Blankets around the inside circumference of the poles, which are supports for the canvas tipi, indicate where the participants were seated

A GROUP OF PEYOTE WORSHIPPERS

This photograph was taken in Stecker, Oklahoma, just after a meeting. The Kiowa medicine man in the buckskin uniform and blanket conducted the ceremony that was held in the tipi in the background

yond saying that they were of the same general character as the images of the kaleidoscope: symmetrical groupings of spiked objects. Then, in the course of the evening, they became distinct, but still indescribable—mostly a vast field of golden jewels, studded with red and green stones, ever changing. At the same time, the air around me seemed to be flushed with vague perfume, producing with the visions a delicious effect and all discomfort had vanished, except a slight faintness and tremor of the hands, which, later on, made it almost impossible to guide a pen as I made notes of the experiment; it was, however, with an effort, always possible to write with a pencil."

Intoxication from peyote is singular in that consciousness is never lost, control of the limbs is maintained, a feeling of well-being is experienced, no urge to commit any act of violence is induced, and rarely are there uncomfortable after-effects. The question as to whether peyote is habit-forming is still unsettled, but observations tend to suggest that it is not. It is not used habitually by the Indians.

To the Indian, peyote is the greatest of all medicines. It is used in the ceremony and in daily life as a therapeutic agent. It is thought to give health and longevity; cleanse body and soul; be good for snake bites and scorpion stings; cure colds, pneumonia, consumption, rheumatism, intestinal ills, toothache, burns, and wounds.

Among the Tarahumare, peyote worship consists of an all-night dance at which a decoction of peyote is drunk. The ceremony takes place around a fire. A cross is erected, under which the drink is kept. An assistant serves it in a gourd to participants. The shaman sits west of the fire; before him, under an inverted gourd, rests a peyote. The gourd serves as a resonator for the rasping sticks which, with the assistant's deer-hoof rattles, provide the rhythm for the dance. The shaman sings praise to peyote all night. In the morning, a curing ceremony may be held. The shaman rasps thrice on the patient's head; the slight dust caused by the rasping is believed to be medicinal.

Around 1880, the Mescalero brought peyote to the Kiowa and Comanche from Mexico. The cult was accepted and moulded into a ceremony suitable to Plains culture. Christian elements, blended with the aboriginal, made it a cult well suited to the changing life of the Indian. This, with the great medicinal attributes of peyote, paved the way for rapid spread to more than thirty tribes.

The all-night ceremony, held in a tipi, consists of quiet singing and praying. The participants sit in a circle inside the tipi, around a crescent-shaped clay altar in the centre. A fire burns east of the altar; the leader sits west. He opens the service by setting a "Father Peyote" on the altar; prayers are addressed to God through this. Tobacco is passed around, and each participant lights a cigarette with a glowing smoke-stick from the altar; prayer then is said.

Then the mescal buttons are passed around, each participant taking four. More may be had at any time.

The singing is started by the leader. He sings four songs accompanied by a gourd-rattle, and a drum that another worshipper beats. The drum (a small iron pot covered

THE PEYOTE IS MOSTLY ROOT

But the crowns, when cut off and dried, form the "mescal buttons" that, when eaten, are believed by the Indians to cure all ills

with buckskin) is thumped rapidly so that the beats fuse into a low hum. The musical instruments are handed around clockwise, each man singing four songs; then the circuit begins again. In the meantime, peyote is being eaten and prayers are being said.

The singing is interrupted for the Midnight and the Dawn Ceremonies when drinking-water is passed around. All paraphernalia are handed to the leader and placed at the altar, prayers are said, and the leader sings appropriate songs. In the Midnight Ceremony, he leaves the tipi, prays, and whistles four times in the four directions on an eagle wing-bone whistle. Doctoring may be done during the Dawn Ceremony; this ritual typically consists of administering peyote tea to the patient, sometimes blowing heat from a glowing ember of the altar-fire over the ailing part, and praying, using the sign of the cross. Members are often brought to be treated.

The ceremony ends at dawn with four "quitting songs" and prayers. The "Father Peyote" may be passed around to bless the group. A meal of corn, meat, fruit, bread, and water follows and after this, the group leaves the tipi, which is usually taken down at once. The rest of the day is spent lounging about, talking and singing; a feast is served by the host at noon.

Peyote serves the Indian not only as a medicine and as a religious sacrament, but its worship provides for religious and social fellowship, an important function, as the older tribal ceremonies are dying out. In some tribes, the Bible is used, interpreted in terms of the peyote religion. Brotherly love is a teaching of the cult; acceptance of what is good in both cultures and reverence for Indian tradition are its most characteristic features. Many believe that the religion is a manifestation of resignation to encroaching white culture, and that the part that this small plant has had in helping to satisfy and reorient the Indian has not yet fully been realised.

Despite fierce opposition from missionary groups, the peyote cult, in Oklahoma, has been organised into a chartered sect—the Native American Church. The latest figures (1922) indicate that about 13,500 Indians participated in the peyote ceremony; the number, however, must be greater now.

In Mexico, the custom of gathering peyote in a forty-day pilgrimage is an annual ceremony; the plant is sought by penitents, gathered ritually, and carried home to be used throughout the year. The Indians of Oklahoma follow this custom of going themselves to gather the plant, but automobiles and trailers are used, and few taboos surround the "pilgrimage".

Many tribes, far removed from the home of peyote, are supplied by merchants situated on the Rio Grande in Texas. A large trade has grown up in mescal buttons; the dried plants are sent by mail as far north as the Canadian border. A conservative estimate of per capita consumption of buttons would amount to about 500 annually. As the price of the buttons varies from $2.50 to $5.00 per thousand, it is evident that the peyote industry is a large one.

Of the many interesting chapters in human history that have centered around the uses of plants, none is more fascinating nor more historically momentous than the one dealing with this extraordinary cactus whose influence is felt far from its restricted native home. And the last pages of the peyote chapter are yet to be written.

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Finders Keepers

By MAURICE J. RONAYNE

This is my world this morning,
  These are my fields to roam,
Though I may tramp for many a mile,
  I'm never away from home.

I've none of the things you cherish
  And few of the joys you share,
But little I find to worry me now,
  For the morning's young and fair.

For the snow is gone from the hills I love,
  All the world is green again,
And a thousand wonders wait for me
  In meadowland and glen.

Others will pass this way today,
  But I am the first to see;
And who's to say that I may not think
  God made this day for me.

Hepatica

By PATSY PATIN

In a corner of the woods,
Warm and wet,
You may find Hepatica,
Growing yet.

She is getting very scarce,
For careless people think,
She is very beautiful,
In her blue and pink.

And so they run and pick her,
From her mossy bed,
And she droops her head and withers;
Little Hepatica is—dead!

And if people pick and pick her,
When the leaves throw back their hoods,
There will be no Hepatica
To bloom in mossy woods.

Ants Do $25,000 Damage At New Britain Hospital

Main Building Escapes, But 12 Others Suffer Extensively.

Here are shown four types inhabiting any termite nest: a supplementary queen, a winged reproductive adult, and, below, a worker, and a soldier

THE TERRIBLE TERMITE

By HUGH SPENCER

Photographs by the Author

EARLY settlers were probably no more alarmed at the cry of "Indians" than are present-day dwellers in wooden buildings at the cry of "termites". These little insects, commonly but erroneously called white ants, have, in the past few years, received almost as much publicity as many other public enemies of larger size who have more conspicuous ways of robbing the public. Owners of wooden houses all over the country are becoming more and more apprehensive over the possibility that their own buildings may harbor colonies of these little chisellers with the big appetites.

The widespread destruction wrought by these insects, said to amount to a yearly total of fifty millions of dollars in the United States, has led to the development of a new industry, that of termite extermination, which in some cases is a legitimate and honest business, but much of which is just another racket preying on the fears and gullibility of the public.

While much has been written and published about termites, I have found that many people still have only a vague idea about the appearance and behavior of these insects, often confusing them with the tropical mound building species. Most of the termite damage in the United States occurs in the south but these insects are found in every state in this country. If, as has been claimed in many a newspaper headline, they are on the increase, this may be due to the general upsetting, by man, of the balance of Nature through the destruction of many wild creatures that would contribute toward keeping them in check.

Termites are social insects living in colonies. Although they are frequently called white ants they are not true ants, but belong to a family of ancient lineage more nearly related to the cockroaches. Normally they are creatures of the forest and in the well organized plans of Nature it is their job to assist in breaking down dead wood and returning it to the soil. Only by accident do they enter the habitations of man and carry on their destruction.

In the termite colony there are several kinds of individuals, or castes. Most conspicuous among these are the workers, soldiers and the nymphs of the reproductive caste. There is also a fertile queen and her spouse or spouses and there may also be several supplementary queens. The first three of these are yellowish white in color, the soldier having a somewhat darker and much enlarged head with prominent mandibles or jaws. Workers are about three sixteenths of an inch in length, the soldiers and the nymphs slightly larger.

The workers are blind miners eating endless galleries in the dark interior of old wood, toiling tirelessly with an industry and perseverance that would be commendable if it did not so often undo the handiwork of man. In the digestion of this insoluble material the termites are assisted by countless microscopic protozoans that inhabit their intestines. They vary this diet of wood cellulose by occasionally eating their own excrement and the cast skins and dead bodies of other termites. The worker eats not only to satisfy his own appetite but also to nourish, by regurgitation, the young nymphs, queens, males and soldiers of the colony. The workers also excavate underground tunnels and build runways of cement in exposed places.

Like the workers, the soldiers are blind and sterile. Their only function is to police the colony and keep out ants and other invaders. Owing to the structure of their jaws they are unable to eat wood and must be fed by the workers.

The queen in her royal chamber is little more than an egg factory. Some colonies have supplementary queens. These lay eggs that produce workers or secondary reproductive forms, and they contribute largely to the rapid increase of the family.

At the time of the annual flight, usually in early spring, the young males and females, dark brown now with slender, lacy wings, swarm out of the nest and take flight. Many of these perish, but those few that succeed in finding mates and suitable locations start new colonies after discarding their wings. The presence of these flying termites is an almost certain sign that there is a termite colony in the vicinity.

Our common termite of the eastern United States is a subterranean species. It lives, usually, in the ground or in wood in contact with the ground. It can live in dry wood only when it can maintain connections with the ground or with other sources of moisture. At times it will build inclosed passages over concrete or stone foundations to reach a food supply but such passages rarely go more than a foot above the soil. Entrance to houses is usually through wooden porches, sills of cellar doors or windows, or other woodwork in contact with the soil. In their wood-mining operations the termites are careful to leave the outer shell of the wood intact, consequently a great deal of damage may be done to a building before there is any visible evidence of their presence.

Methods of protecting buildings against termite invasion are described in bulletins published by the U. S. Department of Agriculture and by the agricultural departments of many states.

For the purpose of study and observation in schools and elsewhere, termites may be kept in a "termite nest". This consists of two panes of glass separated by strips of glass around the edges and held in place on a board by wooden cleats. Soil, food and termites are introduced by removing the strip of glass at one end. This miniature colony will thrive for months if humidity is maintained by adding a few drops of water from time to time.

House Damage By Termites Set At $50,000,000

Menace Found Aggravated by Speed and Covertness of Attack on Woodwork

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The "little chisellers with big appetites" burrow and tunnel their way through woodwork until the foundations of your home may look something like the photographs pictured below. The reproductive form, however, shown as a nymph at the left, refrains from such menial duties, and is fed by the workers

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The American Bowfin—A Living Fossil

By H. REVELL WHITRIDGE

Illustrations by R. Bruce Horsfall

In the summer of 1929, Lake Leelanau, situated in Leelanau County, Michigan, was a body of water new to me. However, I was reasonably sure that there were no species of fish in the lake that I had not caught elsewhere, except the bowfin, *Amia calva.* So I decided to concentrate my efforts on this species, and learn all I could about its habits and fighting qualities at first hand.

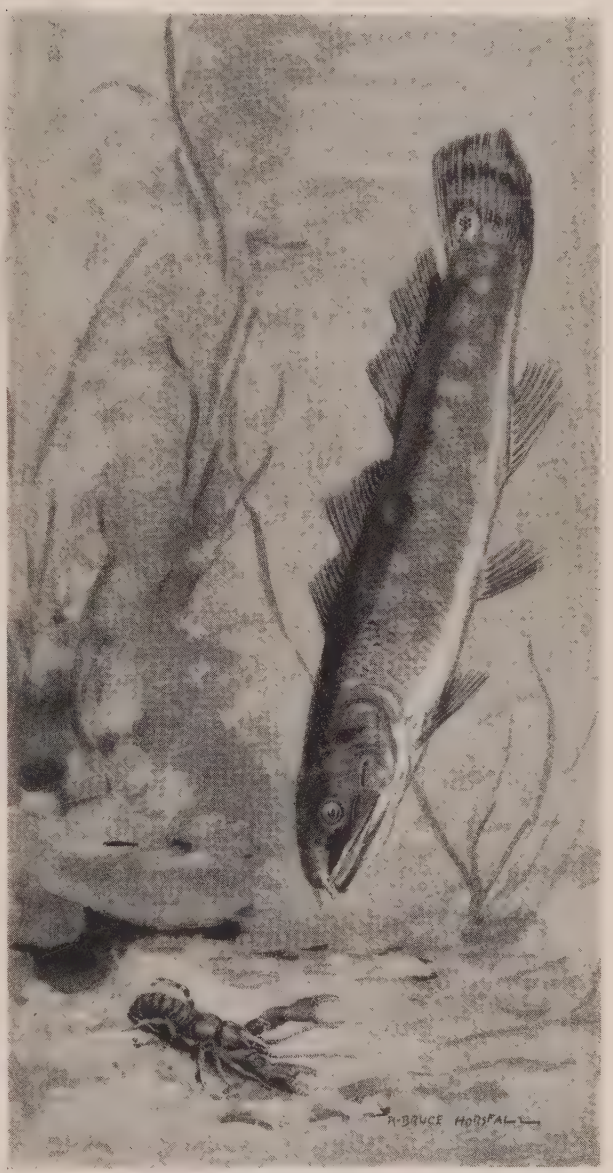
For the first two days I was unsuccessful; and then by chance I saw one where and when I least expected it. On the deep edge of the boathouse, in three feet of water, I had placed a minnow trap baited with oatmeal cooked into a firm mass. I often sat in the end of the boat and looked down at the minnows and small game fish attracted by this bait. Few of us escape the lure of watery depths, whether they be the blue of the salt ocean, or the murky shallows of a pond. The imagination of the Nature lover is awakened by the possibility of what may be below the surface. As a boy, I was always fascinated by the sight of tadpoles, small fishes, or the occasional view of a water snake or turtle in a pond.

This day I had been observing quietly the life around the trap, and in and about the weed bed. I had counted six species of small game fish, a water snake, and two turtles, along with countless minnows. None displayed fear of the others, but all were quite conscious, evidently, of the taste of oatmeal. Suddenly there appeared a head from the weeds on the very bottom—a sinister head, almost perfect in its camouflage of olive green. The head was the size of a man's fist. The eyes stared coldly. Despite the size of the head, I doubt whether my eyes would have distinguished it among the weeds had I not seen it edge into view.

For almost a minute the evil-looking eyes surveyed the life about the trap. Then the head withdrew as though it had dissolved before my eyes. I could compare the whole experience to nothing except my imagination of an elephant peering from the edge of a forest at a group of small children dancing around a Maypole.

If the small fish had observed the monster, surely they had paid no attention to him, for I did not see one quick darting movement such as characterizes fright in these little fellows. I am uncertain as to whether they did not see him, or were without fear, confident of escape in the weeds and shallow water.

The catching of the first bowfin happened the next day at noon. I was using a five-inch common shiner for bait. Fishing in about twelve feet of water, I had scarcely played out ten feet of line when I had a strike vicious enough to have been caused by a four-pound small-mouth black bass. I had several minutes of excellent sport before I landed the prize. The fish weighed nine and a quarter pounds, and was thirty-two inches long. The head was bluntish, and larger by far than my fist. The body, oblong and robust, was covered with large scales, and the general color was dark olive, almost black above, shading down to a light olive green on the sides, and fading to almost a pinkish yellow or sand color on the belly. The mouth was large, slightly oblique, and lined with sharp teeth.



". . . THE BOWFIN IS CARNIVOROUS . . . ITS MAIN DIET CONSISTING OF CRAYFISH, MINNOWS AND OTHER SMALL FISHES."

Few people catching a bowfin are apt to prize it until they are aware of its uniqueness. This quality lies in the fact that it is the only surviving species of the entire family to which it belongs, the family Amiidae. Other

"SUDDENLY THERE APPEARED A HEAD FROM THE WEEDS ON THE VERY BOTTOM—A SINISTER HEAD, ALMOST PERFECT IN ITS CAMOUFLAGE OF OLIVE GREEN."

species of this family that were living millions of years ago are represented now only by fossils. In Europe the indigenous bowfin evidently became extinct at the end of the Lower Miocene period, but in North America our bowfin still survives.

Nor does the great interest of zoologists in the bowfin stop here. Interest in it is increased by a study of its relationship to earlier types. The bowfin claims the distinction, along with the sturgeon, *Acipenser,* and the garfish, *Lepisosteus,* as the main species of ganoids, of being among our most primitive fishes. One of the most obvious of the bowfin's primitive characteristics is the long dorsal fin, which undulates with a graceful rhythmic movement. It is also interesting that it is from the bowfin line of the ganoids that we find the branch of Teleostei, or true bony fishes, descending, a group that comprises the great majority of existing fishes.

The bowfin is one of the few ganoids possessing a gular plate. Its air bladder is cellular, and of respiratory value. From the cycloidal scales, the structure of the fins, and the calcified skeleton, the bowfin seems to be of such modern character that zoologists, until recent years, included it in the herring group. Today, however, the bowfin stands out as the one species of its entire family still surviving, and seems to be found only in North America.

In its feeding habits, the bowfin is carnivorous and extremely voracious, its main diet consisting of crayfish, minnows, and other small fishes. The diet varies, of course, depending on the predominating source of supply. In examining the contents of the stomachs of those I have taken from Lake Leelanau in July and August, I find approximately eighty percent of their diet to be yellow perch. I have found six of these fish, ranging from four to seven inches, in the stomach of one bowfin. The balance of the bowfin's diet, in this lake and in these months, was about evenly divided between crayfish and minnows. It seems to feed at all hours, but I have hooked my largest specimens in the heat of the day, between 10 A. M. and 3 P. M.

I have never been successful in catching this fish on artificial lures. I have a friend, however, who caught one on a spoon, a mother-of-pearl affair, while trolling. Contrary to the usual report that it takes bait deliberately, I have found that when taking live bait, the bowfin strikes in various ways. In fact, it is difficult to know from the strike what kind of fish has attacked your bait. But it is generally a hard smashing drive.

The habit of designating fish by their colloquial names is often confusing, especially to the angler. The bowfin is known by various names in different sections of the country. Some of these names are: dogfish, mudfish, sawyer, lawyer fish, grindle, and even prairie bass. The origins of these names seem to have been lost with the passing of the years. However, there is little doubt in my mind that the bowfin was originally called a dogfish because of its actions when hooked. Since catching my first bowfin, I have hooked and landed dozens of them, and the following example is characteristic of their actions. On this occasion the fish ran fully twenty-five yards in a direct line before I set the hook. About every ten feet I could feel a vicious shake of the fish's head, for all the world displaying the temper that causes a terrier to shake a rat. After this long run, I set the hook hard, in order to drive it through the bony mouth. The reeling-in consisted of pulling in an almost dead weight. But once alongside the boat, this fish again showed its dog-like temperament. It rolled on top of the water, and shook its entire body. I was certainly reminded of my own dog, holding to a piece of rope, refusing to let go, and disputing every inch of ground. I have had this experience time and time again.

Beyond the fighting qualities it possesses, and the great interest it holds for the zoologist, the bowfin seems to be almost worthless. The flesh is not considered edible by most people. I have seen the sands of Lake Michigan, at the fishing village at Leland, Michigan, littered with the skeletons of the bowfin thrown to the gulls, which pick their bones clean. Commercial fishermen do not throw away saleable, edible fish.

The bowfin is found only in North America, where it seems to be found, in varying abundance, from Vermont west to North Dakota, and from Florida as far west as Texas. It is generally found in lakes, swamps, or sluggish rivers and streams. In the Great Lakes and connecting waters, it constitutes, in many places, a recognized menace to the young of edible fish, because of its voracity.

There must have been great drama in the life of the bowfin, since it has managed to survive through millions of years. It would be interesting, could we visualize the tenaciousness this fish must have displayed in its struggle to exist, and the readjustment it must have undergone down through the ages, while all the other species of this entire family perished. We know that the bowfin can live several hours out of water under favorable conditions, and is tenacious of life even when placed at the greatest disadvantage. The explanation of this probably lies in the spacious cellular air-bladder, which acts as a lung. For this reason, the bowfin probably has been able to exist in foul, stagnant water by rising to the surface and taking quantities of air, whereas fish without this cellular air-bladder could not exist.

There is nothing particularly unique in the bowfin's protective coloring or method of camouflage that would account for his survival. However, in its care of offspring we may have another factor bearing on its survival. Like most species of fresh water fish, the bowfin moves into shallow water in the spring for spawning purposes. The exact spawning time varies somewhat, as with all fish, depending upon the geographic location and climatic conditions. The bowfin prefers a reedy place, where the nest is made and the eggs are deposited. The nest is guarded by the male, which is smaller than the female, and is easily distinguished by a round black spot, fringed by orange or yellow, at the base of the caudal fin; only the male and the very young have this spot. No particular effort seems to be made by the guardian fish to hide either itself or the nest. The eggs are yellowish in color, and hatch in about a week. Another two weeks is spent in the nest by the larvae and young fish, the time varying, as with all fish, according to the temperature of the water.

So far, there is nothing in the spawning habit of the bowfin that differs greatly from that of many of the teleosts. But at the period when the young are herded together and taken by the male to favorable locations in search of food, the male's care continues, according to Dr. Bashford Dean, until the young attain a length of several inches. The young fishes are thus protected from many of the natural enemies they would encounter were they left to shift for themselves at a smaller size. In this nursing habit, as well as in its ability to exist in stagnant water, may lie the reason for the bowfin's survival.

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Pupils of Holy Trinity School at Avon, Ohio, maintain their own Nature corner by frequent enjoyable collecting hikes through the nearby woods

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By
JOHN M. VASICEK

YOUTH is naturally curious. "What is that?" is its popular query. Taking advantage of this healthy curiosity and desire for knowledge, Sister Mary Azeveda, S.N.D., teacher of the seventh and eighth grades of Holy Trinity School in Avon, Ohio, has resorted to a novel way of teaching Nature.

Setting aside a corner of the class room, "Our Nature Corner" was started. The work of maintaining the corner was left to the pupils. They were encouraged to bring to class anything that they did not know about, that they thought others would not know about, or that would interest others. They then identified the specimens from source books, found out all that they could about them, labelled and arranged them upon a bulletin board, and explained their findings to the class.

It is surprising the kind and number of things that were brought. They ranged from rocks and minerals to feathers and bits of fur. Living in a rural district, the pupils are naturally interested in weeds. The illustration shows one of their collections, fairly representative of the plant species of that region. In test-tubes fastened to the board were the following plants: shepherd's purse, cat-tail, Johnson grass, milk-weed, wire grass, golden-rod, Queen Anne's lace, wild daisy, lance-leaved thistle, New England aster, Indian mallow, napier grass, summer grass, wild fern, bittersweet, wild oats, white grass, stag-horn sumach, Norway spruce, and fox-tail. The border was of sassafras and pine. And in addition to this there were several moth cocoons and a paper wasp's nest.

Much more might be said about the advantages of this method of teaching, but it is sufficient to say that the pupils enjoy it, and that when they ask "What is that?" they learn to find the answer themselves and soon know what "that" is.

SWANS SAIL GENTLY ON THE SLOUGH AT GEBAUER'S SANCTUARY

The first swan to become a guest was nursed back to health after it had been badly wounded by a hunter shooting out of season. Its presence attracted others

WILD GOOSE HAVEN

By MYRTLE J. BROLEY

FROM hunting down birds, exulting in the good shot that sent a plump duck or goose hurtling earthward, to spending long, cold hours scraping out a pond on which such birds might find sanctuary, seems quite a long step. That it was a most happy one can be vouched for by the Gebauer brothers of Manitoba.

For many years these husky lads looked forward with pleasure to the opening of the shooting season. Many a duck and goose, partridge and grouse fell to their guns. Nor had they any idea that they would ever cease to enjoy this sport.

Then one cold evening in October a gray goose lit in with the tame flock feeding in the yard. When John shut the fowl into the barn for the night the wild goose went in too. In the morning she calmly accepted the men when they came in with food, making less fuss than did the tame birds.

"Look," said John to Joe, watching her velvety black head and neck, "she wants to be friendly. I guess we're the wild ones really. If we'd only leave them alone the birds would soon be tame enough."

The flock was shut up for the winter and the gray goose stayed with them. Through the long, cold days the boys became fond of Pal, as they called her. Anxious to know more about her and her kind, they bought books to study.

One night, the chores all finished, they were sitting around the table when John slapped his book down. "Listen, fellows," excitedly looking from one to other of them, "why don't we make a pond and try to coax more geese in here? Hundreds pass over in the spring. There aren't many places around here for them to rest. I bet they'd come to a good pond, especially if they found out it was safe."

"How're you going to scrape it out?" said Alec, the practical, "and if you do, how'll you get it filled with water?"

"We've still got that old scraper and maybe we could borrow another from Sam. It'll be good for Jupiter and the old gray to have a little work." He paused, thinking it over, then his face lit up and he turned to Joe. "You know that old Ford engine out there?" Joe nodded. "Couldn't you rig up a pump with that?"

It wasn't easy, but they did get a pond scraped out, three hundred by two hundred and forty feet. Next year when the snow melted they had a small engine fixed up and the water lying on the fields was pumped into the pond.

The boys were delighted when, near the last of March, three mallards and a pintail landed on the pond. They were successful! Eagerly they watched to see what the next arrivals would be.

Pal's honking sent them hurrying out just at dawn one April morning to see three Canada geese planing down to the water. And then, borne by the soft southern breeze, a great band of snow and blue

The confidence with which this Canada goose poses is a symbol of sanctuary. This story of a haven created on a prairie farm by the Gebauer brothers carries its own message. Once ardent hunters, these brothers have found far greater happiness in being hosts to a wide variety of migratory birds, and have proved themselves successful bird doctors by rescuing wounded birds and giving them health and security, if not the ability to take wing once more

geese landed on the nearby stubble field to rest and feed. Numbers of them made their way to the pond, flying up and over like a veritable snowstorm. The boys had never seen them so close although flocks of thousands pass over every spring, resting and feeding in Manitoba before flying on to their nesting grounds beyond the Arctic Circle and in Baffin Land. Now, however, they could easily distinguish the pure white plumage with black wing tips of the snows, and the white head and neck and darker colored bodies of the blues.

IN THE PICTURE ABOVE A MALLARD DUCK APPROACHES ITS NEST ON THE GEBAUER SANCTUARY. DURING THE NESTING SEASON MANY WATERFOWL FIND HAVEN HERE AND SAFELY RAISE THEIR YOUNG IN THE SLOUGHS

At the right a blue goose sits on her nest. One of the pets of the farm is Gizzler, a blue goose that follows John about, going out into the fields with him and often flying into his arms to nestle contentedly there

This flock remained around the pond for a few days, and then, calling clamorously, went on north, possibly to join the larger flocks around Grant's Lake. Other smaller bands came to stay for short periods and four slightly wounded blues and a snow remained after all the others had gone on.

John was ploughing one day when he noticed a line of birds winging swiftly from the South. He halted the horses and stood watching them. In a shaft of sunlight they were revealed as large, pure white birds, and he saw that they were swans. As he stood, exulting in their grace and beauty, wondering if any of their species would ever stop on his little pond, there was a flash as a sunbeam was reflected from a rifle barrel, and one of the great birds wavered, turned and sailed heavily in his direction.

Through mud and water he ran to get the lovely creature, praying, hoping that it might be only slightly wounded. He had just picked up the almost lifeless body when two men, panting heavily, lumbered up to demand it as their quarry.

"I'll report you both for shooting in the spring and for killing a protected species," John said angrily.

The men blustered, coaxed, but John was adamant and at last they went off vowing to get even. Leaving the patient horses standing, John hurried home with the swan. For some weeks he nursed it almost hopelessly. The bullet that had grazed the curving neck had also crippled one thigh, and there seemed to be internal injuries as well.

"You're just wasting your time," Alec assured him. "You can't possibly bring it around."

Kindness often works wonders, and so it was in this case. Soon the bird began to eat a little more. It became livelier and now it floats gracefully upon the pond or hurries awkwardly about the yard after John.

Nor is it companionless, for that fall another swan, a juvenile in its grayish plumage, dropped in beside it and has stayed ever since. Two more, picked up in the fields, were brought in to be nursed back to health. Their wounds are healed now and they are free to leave, but the pond has become home to them and here they are content to stay. So far none of them have nested but the boys are hoping that they will. Other swans have stopped to rest or to feed, but have gone on again.

With so many birds accepting their hospitality the Gebauer brothers decided to give them more space. Two more ponds were dug and filled with water and low bushes planted on the mounds of earth forming the sides of the pond so that ducks and geese would find suitable spots for nesting. The oldest pond, the one farthest from the house, has reeds and wild rice growing at one end,

and here those birds that prefer nests surrounded by water have their homes. Three pairs of Canada geese pre-empted one pond and nest on its banks. Of course the other water fowl come in and around this pond but not near the precious nests.

One of the pets on the farm is a beautiful blue goose whose arrival one fall proved that a few of these geese do go south again over Manitoba, instead of keeping far to the east over the Great Lakes. All winter he was shut up, unable to use his wings. When spring came he was wildly excited. The first day the doors were opened, he flew up as if to go off, but inaction had made him clumsy. He crashed into a pole and his neck and breast were badly torn. He was bleeding when John ran to pick him up.

Could the skin be stitched back? John decided it was worth a try. Getting needle and thread, he drenched the wound with iodine. Carefully he drew flesh and feathers into place again. Today only a tiny mark is left.

Gizzler, as they call him from his peculiar way of eating, follows John about the yard. He even flies out into the fields and stays with him while he ploughs, or cuts the golden grain. Whenever possible he flies up into John's arms, snuggling contentedly against him. Anyone walking around the farm is apt to find Gizzler untying shoe laces, pulling at bits of thread from clothing, or carrying on an intermittent cackling as if holding conversation.

THE THREE GRACES

Three snow geese feed happily about the sanctuary, many of their kind finding haven there

A commotion among the ducks one night sent Joe hurrying out. The "Hoo-hoo" of a great horned owl told him what was wrong. For some nights the silent killer continued his raids, keeping the water fowl in an uproar. Efforts to find its hiding place seemed unavailing, but sharp eyes discovered him sleeping in a maple. A bullet put an end to his marauding.

Much has been learned from studying the birds on the ponds. Almost every spring one or two rare or unusual visitors stop here. The boys tell of a black bird, about the size of a bittern with a curved bill that stayed around for two days. Undoubtedly this was a glossy ibis or black curlew, surprisingly far north.

Last spring a beautiful snow goose stayed at the pond and mated with Gizzler. The blue and snow geese always fly North together but were not known to mate. Four little goslings were hatched safely, two of them exactly like their snow mother while two had the pure white head and throat and dark back of Gizzler.

At first the little pied-billed grebes, inimitable little divers, were most welcome but they are heartily disliked now since John found one killing a mallard duckling. He had seen the ten newly-hatched babies, then a few hours later noticed the still warm bodies of four of them. What could have killed them? Returning a little later he saw a grebe striking a duckling repeatedly. By the time he rescued the little fellow it was almost done for.

Perhaps the greatest thrill the boys have had came one April afternoon. A flock of twelve wood ducks, seven beautifully plumed and colored males, landed on the pond. The boys had never seen these lovely creatures before but they knew them from the many pictures they had studied. Through field glasses they admired the purplish crest with its white lines and the drakes' greenish-blue heads and the metallic bronzy backs.

"It's hard to tell the colors on them," John said, "they change as the light strikes them. Anyway they're the most beautiful birds we've had around here, and so light and graceful on the water!"

Will places such as Gebauer's bring back this dwindling species so that more of us may exult in its beauty? What a blessing if this is so, for the wood duck is becoming a rarity indeed in most places.

Many ducks and geese winter on the Gebauer place, but the greater part of them, even the young birds raised there, migrate south. During the blasts and blizzards of the northern winters, the boys study about their friends, plan how to make their ponds better and safer for them and devise ways and means of feeding the increasing flocks of migrants.

A year ago last fall they were worried because there was so little food left out for the throngs of snow and blue geese, so they left a goodly bit of grain standing on one of their own fields. Although it was quite close to the house the geese cleaned it up thoroughly before they left the first week in May. Then John burned the stubble, ploughed it under, and, in spite of the extremely dry summer, this field returned the best yield of grain on the farm. So Nature paid for the kindness to her feathered children.

"Having the ducks and geese here has been the biggest joy we've had," John told us. "It was fun trying to outwit them in the air and get a good shot, but it's far more fun to have them make friends with you and eat out of your hand; nice to have them nesting around the place, bringing their downy young in here to feed."

"Yes," Joe added, "and to watch the differences in them. Lots of them come here wild, and stay. But there's

old Sober-sides, that Canada over there. He'll never fly again—wing broken, but every spring he starts walking north. We have to go after him and bring him back or else the wolves would get him. He just cannot seem to get over his desire to return to his old nesting ground."

People from different parts of the country write to ask about the place and about the birds, and many visitors come to see these tame wildfowl. Watching the lovely creatures as they float about on the water, hearing the wild and stirring calls of goose and swan, or the swift beat of wings as a thousand or so birds take to the air, we realize that here is a worthwhile effort indeed, and although it is off the beaten track the world will make a road to the Gebauer gate.

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SUGAR-PINES SAVED

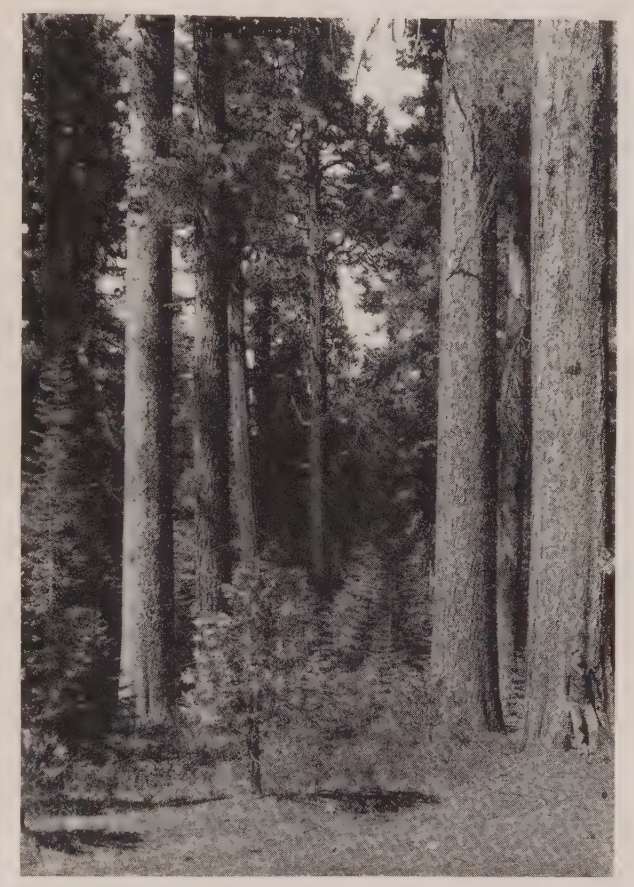
WHEN visitors to Yosemite National Park follow the winding Big Oak Flat Road through ten or twelve miles of glorious sugar-pine forest to the ark entrance, they will be passing through what was ist yesterday on the verge of becoming a desolate, tree-ripped waste. Now these trees will be preserved for osterity through Act of Congress vesting in the Secretary f the Interior authority to acquire 7200 acres of sugar-ines known as the Carl Inn Tract. The area borders the estern boundary of the Park, and, when acquired by urchase or condemnation, will be added to Yosemite.

As we go to press we discover that funds originally ar-marked for this purchase must be reappropriated. Ir. Roosevelt has asked that this be done. We trust that ongress does not fail us.

"There is no opportunity anywhere else in the world preserve as magnificent an example of virgin sugar-ine as exists at this one place," declared Arno B. Cam-erer, Director of the National Park Service, upon an-ouncement of President Roosevelt's signature of the ls authorizing acquisition. Of the total area involved, 00 acres are in private ownership and were marked for ly cutting.

Legislation in behalf of the sugar-pines was introduced Senator McAdoo and Representative McGroarty, both whom actively fostered the legislation. However, major dit for saving this timber stand must go to the Emer-cy Conservation Committee which, under the leader-ip of Mrs. C. N. Edge, mobilized support behind the gislation and led the fight for it. The American Nature ssociation is proud to have had its part in giving pub-city to the situation and in actively supporting the solu-on achieved.

Upon the passage of the bills by the Congress, Mrs. Edge sent to us a typical picture of this area taken by Willard G. Van Name, who also has steadfastly fought for these trees. With the picture was a poem. We print both herewith to round out this record of victory for a conservation ideal.



* * *

his park is temple to ONE GOD, UNKNOWN,
Its beauty showing forth HIS mighty powers;
Ark is ringed with glacier-polished stone;
Its floor bright flowers.

ere at the gate the peristyle of pines
Invites to Hope the downcast of all creeds,
inting in masterly, up-springing lines
To solace for all needs.

Great columns, smoothly tapered, finely grooved,
Lift interlacing arches of live green,
Arcades through which the centuries have moved
Forward to Truth Unseen.

Marching beneath spread fans of richest vaulting
Toward shining altar steps they yet shall scale,
New centuries, new standards high exalting,
Shall pass within the Veil.

A Private Museum with a Promise

By RALPH T. GARDNER

NO, NOT A ROOM IN THE MUSEUM OF NATURAL HISTORY

But twenty years of devotion to natural history are represented in the unique private museum of Jay T. Fox, of Seaford, Long Island. School groups, Boy Scout Troops and adults come from many miles around to visit the Fox Museum

Ask any average boy a question about beetles, Indian relics or sea shells, and he will reply, "How should I know?" But if you asked a youngster out at Seaford, Long Island, there is an even chance that you would find yourself in the presence of an amateur scientist who would tie your adult egotism into a knot and drop it into the cold green waters of Long Island Sound.

This is because Seaford has two things that every progressive community will have some day and ought to have now—a natural history museum and a Junior Explorers' Club. In the case of Seaford, however, they are not public institutions. They are the spare time creations of a Nature lover named Jay T. Fox.

For many miles around Seaford, "Fox's Museum" is a familiar term. It is a mecca for youthful outdoor enthusiasts, the focal point for many a pilgrimage. School classes, Boy Scout troops and adult groups find their journeys well rewarded. No other such museum exists on Long Island.

How rich with interest the leisure hours of life can become is shown by Jay Fox's life. He has developed in his own home a natural history exhibition containing over eight thousand specimens, the collecting of which required nearly twenty years of his odd hours. A basement room that in most houses would be mere storage space has been fitted out with satisfying displays representing the whole kingdom of living things. On Saturday and Sunday afternoons it is open to the public, and admission is free. During these hours its kind-hearted owner entertains his visitors with Nature stories and illustrated lectures. So intense is his enthusiasm that the lives of many who come are permanently enriched—particularly boys.

New York has its famous Explorers' Club. Some of its members had their first great inspiration in the American Museum of Natural History, and now that they are distinguished scientists, they pour into its treasure chests the best of their life work. The youthful Nature lovers of Seaford have formed a Junior Explorers' Club, to unite the doings of those who have been initiated into Nature's devious ways through the Fox Museum. Its members are from ten to fifteen years old.

But you can't have explorers without expeditions. Often, therefore, on Saturday or Sunday, Fox abandons his museum, packs the car full of laughing, intelligent-

faced children, and drives merrily away to a stream, a wood or a shallow bay for an afternoon of exciting discoveries.

Almost as easily as a business man reaches into a filing cabinet, he knows where to find the most interesting objects. At every turn he points to something intriguing. He pauses beside a fence post. Here is the nest of a carpenter bee. She has bored her way within, laid her eggs, sealed them up and provided food for her young when they hatch. Over there is a place to dig for Indian relics. Where the boys see one living creature in the wood, he sees five. To be with him is both a game and an adventure, as hour after hour he clarifies the mysteries that abound on every hand.

FOX'S LECTURES HOLD HIS LISTENERS SPELLBOUND

Usually as active as bubbling teapots, the members of the Junior Explorers' Club quiet down as Mr. Fox explains the habits of the queer porcupine fish

What a contrast this is with the required "Nature walks" at some camps, where youngsters are burdened with marks on their disciplined knowledge. Lessons, studies and grades are as far from the Junior Explorers' Club as they are from that other Explorers' Club uptown in Manhattan. Whether in the field or going over their experiences in Fox's home, the boys, eager with questions, have their curiosity at once satisfied and renewed by the seemingly inexhaustible knowledge of their leader. Interest provides whatever discipline is needed. By utter informality, by the total absence of all requirements, the precious fires of enthusiasm, worth more than any grade or degree, are kept burning. It is probably because he doesn't try to be a teacher that Jay is so successful with his boys.

To him the world is a huge aggregation of wonders. To observe and understand is a consuming passion, ever new and challenging. Everything is open. Nothing is final, nothing dogmatic. His boys are carried with him by the force of his own intensity. It is a teaching technique that is denied to teachers who must remain indoors with fifty pupils on fixed routines laid down by others.

During winter evenings, Fox's boys have opportunities of another sort. They learn the use of laboratory apparatus —microscopes, dissecting instruments and camera. Much is made of a few specimens, as the group has a warmer regard for living things than dead ones. This is all just as much fun for Fox as for the youngsters. For twenty years he was bottled up in a city apartment, stowing his collections in odd corners. He obtained release from his cramped quarters only a few years ago when he purchased a modest two-story summer home on Long Island. His basement museum was opened in April, 1936.

An outside entrance leads into a softly lighted room, the far end of which opens into a tiny laboratory. The walls have been covered by a gray-brown composition board, divided into panels. In a definite, evolutionary order along the two sides, the various families of the animal kingdom are represented. Beneath the panels are cabinets loaded with minerals, fossils and shells. End walls are given to other exhibits. So effective are the displays that every square foot of space seems to say to the visitor, "Come and look at me."

Although the use of signs makes it possible to find one's way, the public-spirited curator is always willing to explain in rich detail. His familiarity with natural history is a joy to the heart and inspiration to the mind.

Then, Mr. Fox, by a few quick touches, turns his museum into a lec-

FISH STUDIES ARE POPULAR

Many of the fish breeding experiments are carried on with the help of the members of the Explorers' Club

ture hall that seats twenty persons, with a shining screen at one end, and a powerful stereopticon at the other. He proceeds to put on a show that would do credit to a professional speaker. He not only possesses many slides of his own making, but his wide acquaintance with scientists gives him access to huge collections of slides.

Between the laboratory and the display room, there are fifteen tanks teeming with exotic fish, in which breeding experiments are carried on, often with the aid of the X-ray and ultra-violet treatments.

The tiny laboratory itself, measuring only seven by twelve feet, is an example of efficiently used space. Within it are compressed a dissecting table, a microscopic table, typewriter stand, filing cabinet, shelves for books and specimens, folding drawing table, illuminated platform with vertical camera, darkroom apparatus for developing and printing, a chemical laboratory with electrolytic apparatus, folding chairs for lectures, and a 400-watt stereopticon. And, what is more to the point, they are well used.

All this activity, however, is avocational. The Fox household consists of a wife, and two daughters attending college, who must be supported. (There are no sons to belong to the Junior Explorers, though one of the Fox girls is seriously following her father's steps.) During business hours, the head of the family is confidential aide to Justice Peter Schmuck of the New York County Supreme Court.

Starting out many years ago as an electrical engineer, Fox became chief inspector for a large power machinery concern. For thirteen years he traveled through the United States, Canada and Mexico. In his spare time on these trips he gathered most of his specimens.

He was X-ray engineer for a time in the New York City Department of Hospitals, but resigned when he was appointed confidential secretary to Mayor John P. O'Brien of New York City, which led to his present post.

Fox has another hobby besides Nature collecting: Chinatown. He knows all the big-wigs, shop owners and tong leaders. Many of them visit his home, where he serves tiger bone wine, snake wine and other Asiatic delicacies in his newly fitted-out Chinese game room.

Every February, when "Kung Hee Fat Toy" comes around, which seems to be the way you say "Happy New Year" in Chinese, Fox and his family are deluged with invitations from Chinatown. During the height of the season, lasting a week or more, they are on the go every evening, the ladies wearing their imported Chinese Mandarin dresses.

"Collecting marine invertebrates is my special hobby," Fox confesses, when the talk returns invariably to his central enthusiasm. "No shore of Long Island is more than a few miles away, and there are seven miles of shallow bay, in much of which the water is rarely over a few inches deep at low tide. To collect sponges, starfish, sea shells and marine worms, all you need is a pair of boots and the ambition to see and learn about new things.

"For three years I also have been making a study of the praying mantis. Each fall I gather about fifty nests. Each nest contains around 450 eggs. During the winter I hatch these prematurely by artificial heat, and note every minute detail.

"If ever any insect deserved the title of 'cannibal queen', Mrs. Mantis is the one. In the fall I have seen one female devour seventeen crickets at a feeding. She does not eat the hard parts, but sucks the body juices dry. She invariably devours her mate also, who is somewhat smaller, when he is no longer needed.

"Strangely, after the female mantis lays her eggs, she goes on a hunger strike. I have seen many starve to death in approximately five days after completion of the nest, in a breeding cage full of smaller insects. So it is that each autumn the life cycle of the mantis family ends with nothing but the nests of eggs to carry on the species when spring comes around.

"The hatching is fascinating to watch, because the youngsters show their cannibalism from the time of birth. I have seen a tiny mantis, only five minutes after it emerged, attack a spider four times its size.

"When the insects are able to fend for themselves, I set them free."

Many cases of how amateur scientists can help their professional brothers might be illustrated by Fox's experiences. At Bethpage, Long Island, under a seventy-foot deposit of clay left by a glacier, he found pieces of lignite (brown coal). They were the semi-carbonized wood of ancient trees belonging to the cretaceous period. Two of the specimens were honeycombed with the borings of the teredo or shipworm. As this worm inhabits only the salt water, the specimens prove that the Atlantic Ocean came up to Bethpage in pre-glacial times. Now this spot is fifteen miles inland.

One of Fox's best finds was the discovery of one of the largest communal burials ever located in the East, a grave measuring ten by thirteen feet, containing twenty-four Indian skeletons. In addition there were 600-odd fragments of pottery and about 20 stone artifacts, arrowheads and spearheads.

Fox's ambition now is to get enough funds to erect a natural history museum building in his community. If he finds citizens to back him, he will give his own collections and obtain others from friends and institutions, devoting the later years of his life to the museum's improvement. Indeed, he would like to see modest scientific museums established in small communities all over the country. And he would like to encourage older Nature lovers to form bands of youngsters like his own.

"Junior Explorers' Clubs are needed not only in cities," declares Fox, "where boys and girls are starved for want of intelligent contact with Nature, but also in less densely populated regions. For it is common knowledge that many of those who are most ignorant of Nature are physically the nearest to her and in the best position to know her."

A Few Random Notes on the BALD EAGLE

By N. R. CASILLO

THE perennial yarns of the predatory fierceness of the bald eagle once again have been dusted off and are being broadcast throughout the land. Just a few days ago I read in a national magazine of wide circulation that "the eagles are seldom gentle and are amongst the fiercest birds of prey. They attack sheep, rabbits and often wolves. Eagles have tremendous appetites and have been known to devour a calf, a sheep and a dog in a single week." The author of the article, however, fails to disclose whether it was a single bird or a group of them that "devoured" the formidable repast. But, he does convey the impression that eagles had actually brought down the animals mentioned.

In another influential periodical it was averred that eagles have been known to attack children, and one was seen to fight and carry off a wildcat. Paradoxically, in another issue of the same paper there was an item about an eagle being ignominiously vanquished by a six-months-old Plymouth Rock rooster, the latter actually killing the large bird of prey.

OUR NATIONAL EMBLEM—A MENACE OR AN ASSET?
High atop a dead tree in southeastern Alaska, the bald eagle settles on his nest, wondering, perhaps, why man should point him out as one of the most malicious of killers

With apologies to the Bard, "what manner of bird is this?" It surely cannot be the same bird that I observed daily during my three-months' stay on the Alaskan archipelago; a period during which I never once saw an eagle attack anything alive, unless the few salmon that they pirated from ospreys could be considered living prey.

My observations of the birds were not casual, but were systematically conducted studies of more than one-hundred individuals. A part of my duties as a salmon trap watcher was to dispatch as many eagles as possible, so that I had plenty of opportunity for observation, although I must confess to a woeful neglect of the prescribed duties in spite of the federal bounty of one dollar.

It was contended (and still is) by the salmon interests that the eagle was responsible for the tremendously reduced numbers of salmon. After I had had a little time to size up the situation, I began to wonder how a group of apparently intelligent men could formulate the opinions they had about a creature that seemed wholly inoffensive so far as live fish were concerned. Indeed, I thought them decidedly beneficial, for they consumed quantities of decomposed fish carcasses that drifted ashore. In fact, they showed a decided preference for carcasses that showed the most decay.

People have accused the eagle of destroying not only grouse, ptarmigan and waterfowl, but also young caribou, mountain sheep and goats. But why the eagles should leave an abundant supply of their favorite food, available along practically any watercourse, has always been a source of wonder to me, particularly when considering the comparative difficulty involving the capture of the prey that they are accused of taking. To this I might add that on eleven separate instances I observed young fawns in the company of their mothers contentedly feeding within easy striking distances of several eagles. Did the eagles so much as turn a covetous eye in their direction? I should say not. They preferred to waddle clumsily from one festering pile of fish to another, selecting choice morsels to eat there on the spot, or to carry off to their young.

During the summer of 1924 a pair of eagles included Lake Morey, near Fairlee, Vermont, as part of their range.

Again I had unusual opportunities for study because I happened to be spending the summer there.

At the west end of the lake lived several farmers who expressed the belief that their poultry would be unsafe with the eagles about. But during the course of the season not a single head was reported missing, although the eagles were frequently seen nearby feeding on the thousands of dead fish that were killed that summer by fungal parasites.

To determine, if possible, the lifting power of an eagle, I anchored a dead four-pound pickerel to a ten-pound rock in fifteen feet of water, the fish, of course, floating on the surface at the end of a stout line. Just as I had expected, one of the eagles (the female) swooped, grasped the fish and tried to make off with it. During the short interval of violent wingbeating it succeeded in dragging the rock about twenty feet. Then it dropped the obstinate fish and winged off in disgust at its failure.

An average bald eagle weighs between eight and twelve pounds, and can probably lift the equivalent of its own weight. Yet the species has been reported to have carried off children weighing up to fifty pounds. A newspaper item before me states that an eight-year-old boy was seized by one and lifted a good twenty feet before he was dropped to the ground.

Why is it that those who have had the greatest opportunities to observe the regal birds never have seen them performing the sensational feats of strength and ferocity with which they are too frequently credited? I long ago relegated eagle stories to the same limbo to which I consign most of the snake stories that are extant.

Why not give the bird that was chosen as our national emblem a chance? Even if he were as destructive as he has been pictured by some, there would still be excellent reasons for the preservation of the living symbol of our liberty and freedom because it is a fitting symbol.

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Things to Think About

Under a law passed by the 1937 Michigan Legislature no roadside zoos or exhibits of wild life for commercial purposes may be maintained without permit from the State Director of Conservation. The law authorizes the Conservation Commission to prepare and enforce regulations requiring adequate sanitation, housing and safety at such zoos. Short of abolition of such exhibits, stringent regulation is the next best thing. We trust that the Michigan Conservation Commission does a thorough job.

* * *

Backed by a powerful billboard lobby, an amendment to the California Outdoor Advertising Act that would have classed billboards as "necessities" along with filling stations and eating places in roadside areas protectively zoned was passed by the Legislature. The measure was a blow at county zoning rights. The Governor of California is to be congratulated on having given the act a pocket veto, failing to sign it before the time limit expired.

* * *

Bills seeking to class the mourning dove as a game bird, to repeal the existing closed season on quail in ten northern counties and to destroy Troy Meadows as a wildlife sanctuary were defeated at the recent session of the New Jersey Legislature. Many organizations joined with the New Jersey Audubon Society in an active and successful fight against these measures.

* * *

Amendment to the Conservation Law of New York by the recent Legislature has set a definite hour for the opening and closing of hunting during the fall and winter seasons. Formerly hunting started at sunrise and closed at sunset, with resultant argument as to when the sun rose and set. Now the hours have been set as from seven in the morning to five at night. However, to check the usual slaughter on the opening day of the upland game bird season, shooting will not commence until noon.

* * *

While highway zoning is thoroughly discussed in the current issue of *The Roadside Bulletin,* published by the National Roadside Council with the collaboration of the American Nature Association, one of its most striking features is "A Pictorial Story of the American Highway." Mrs. W. L. Lawton, chairman of the Council, has chosen a series of illustrations showing what has happened to the American highway and its environs in most parts of the country, and, by contrast, what can happen when the authorities have the vision to guard against the usual roadside parasites.

This graphic presentation of conditions provides a perfect background for discussion of zoning as applied to the rural highway. Albert S. Bard, counsel to the National Roadside Council, presents the general case for highway zoning as opposed to mere regulation. This is followed by a report on the progress in California through county zoning. In that State important practical work is being done. Zoning elsewhere is discussed and the *Bulletin* contains other reports of progress from different parts of the country. Copies of *The Roadside Bulletin* may be obtained from the National Roadside Council, 119 East 19th Street, New York City, at ten cents a copy, twelve for a dollar, or five dollars per hundred.

* * *

Oklahoma has succumbed to the anti-crow propaganda and the Legislature has appropriated $6000 to be used solely for materials and equipment to kill these birds. At least it will not be doled out to sportsmen's clubs in prizes for the most crows shot.

BULBS FROM SPRING TO FALL

By VICTOR H. RIES

THERE are many varieties of flowering bulbs available that enable gardeners to obtain a succession of blooms from early spring to fall, but rare indeed is the gardener who takes advantage of the many kinds offered for sale. And yet, every garden has a dozen or more places where flowering bulbs may be tucked in without disturbing existing plantings, as they may be used in all sorts of places to blossom forth when their turn comes around. Most of these are hardy and may be left undisturbed year after year; a few are tender and must be lifted and stored in the cellar over winter.

But let us see some of the places we may use bulbs.

DAFFODILS ARE AN ASSET TO ANY GARDEN
A group of these beautiful blooms furnishes spring color to the author's garden, growing before the fountain grass that will later shade them

In the rock garden: crocus, grape hyacinth, winter aconite, guinea hen flower, squills, species tulips, the smaller narcissus, *Zephyranthes, Colchicum,* coral lily, and *Lilium elegans.*

In the wild garden: many of the lilies, squills, and grape hyacinths.

Back of the pool: lilies, narcissus, crocus, grape hyacinths, squills, summer hyacinths, and *Fritillaria.*

Among the lower growing shrubs: tiger lily, Hanson lily, Henry lily, or any other of the taller growing lilies; also gladiolus.

At the base of trees: grape hyacinth, squills, narcissus, crocus and tiger lilies.

In the perennial border: any of the bulbs, especially lilies of all kinds, narcissus, gladiolus, tulips, *Tigridia* and the early flowering bulbs as crocus, squill and grape hyacinth.

Among low growing evergreens: gladiolus, summer hyacinth, the taller lilies.

In front of evergreens: crocus, grape hyacinth, narcissus, hyacinth, tulips, squills, *Lilium elegans, Lilium concolor,* winter aconite.

Beneath tall shrubs: narcissus, grape hyacinth, crocus, squills.

Under the grape arbor: Narcissus, crocus, squills, tuberous begonias, spider lily, hardy begonia.

Along the north side of house: narcissus, crocus, grape hyacinth, tuberous begonia, hardy begonia.

In the myrtle (periwinkle) ground cover beneath trees—crocus, narcissus, squills, even tiger lilies and turkscap lilies.

Around the bird bath: crocus, grape hyacinth, squills, narcissus, early tulips, *Zephyranthes.*

Along the garden path; narcissus, crocus, grape hyacinth, hardy gladiolus, *Montbretia,* tulips.

ONE END OF THE AUTHOR'S GARDEN
Tucked in among the rock plants, many early spring flowering bulbs grace this dry wall and terrace

SPANISH BLUEBELL

This plant, *Scilla hispanica,* is quite similar to the English bluebell, *Scilla nutans.* Both make themselves at home in sun or shade

Above a dry stone wall: crocus, grape hyacinth, early tulip, narcissus, *Zephyranthes,* oxalis.

These are but a few of the many places bulbs may be used.

The lawn often has been recommended as a suitable place for planting bulbs, but actually this is not the case. If the bulb foliage is cut off before it ripens while mowing the lawn, the bulb soon will disappear. If the grass is allowed to grow it soon becomes unsightly. The best plan is to plant your bulbs where mowing is not necessary.

Now let us look at some of these various bulbs we are going to use to add to our garden color. First, when do we plant them? The hardy bulbs may be planted any time before the ground freezes but preferably as soon as possible after they are available in the fall. This will usually be October, with the exception of the lilies, which, if they are imported, as most of them are, will not arrive until late November. So be prepared and cover the places you have selected for lilies with six inches or so of leaves to keep them from freezing.

To take the bulbs more or less in order of their bloom, first of all we have the winter aconite or *Eranthis.* Blooming shortly after the ground thaws, its bright yellow flowers on four-inch stems are best enjoyed if planted where they may be seen from your window. Once established they are hardy, permanent, and may multiply if the situation is congenial.

Next in bloom will probably be the Siberian squill, *Scilla siberica,* with its dark blue flowers. Once it becomes established it is sure to multiply and spread. It may even self-sow if the soil is suitable.

Following in quick succession we find the chionodoxas, glory-of-the-snow, and the many varieties of crocus, some blooming much earlier than others, some yellow, others white, lavender or purple.

As with the winter aconite, all of these early spring bulbs are best used where they may be observed from the windows, for many are the days while they are in bloom that we hesitate venturing forth into the garden to enjoy them. They are best planted in masses to give the maximum effect from a distance. My neighbor's garden has thousands of crocus, grape hyacinths and squills, scattered in patches throughout the perennial border where they bloom long before the perennials have started to grow. In this way they give the gardener an additional period of beauty.

We have mentioned grape hyacinths. Once you try them or even see them you will always want them. Using not only the early *Muscari botryoides,* but the later variety, Heavenly Blue, which blooms two to three weeks later, you can have these charming little flowers in bloom for a month or so in your garden. There are a number of other varieties worth growing, as well.

Now we come to the tulips. One of the earliest in bloom is the Kaufman tulip—one of the wild species. It blooms at the same time as the earlier flowering daffodils or narcissus.

A few varieties that you will especially enjoy are Alasnam, Queen of Spain, Thallia, John Evelyn, Nellie O'Melvie, Laurens Koster, Mrs. Krelage, Bath's Flame, Spring Glory, Diana Kiasner, Will Scarlett, Early Surprise, Cheerfulness, Lucifer, Bernadino, Lord Kitchener, and Twink. Or, if you want a pink trumpet, you may save up for a Mrs. Backhouse. Most of these you will want to plant where you can see them at close range. They may be among the perennials or in a bed by themselves, to be planted later to annuals, or hardy chrysanthemums that you expect to dig and store over winter in a cold frame.

Buy a selection of early flowering and late flowering varieties of narcissus. They will bloom in from four to six weeks.

Do you, by the way, know the difference between narcissus, daffodil and jonquil? Narcissus is the scientific name of the genus. Daffodil is the common name. All narcissuses are daffodils and vice versa. Jonquils are one particular kind of narcissus or daffodil. They have several small yellow flowers to a stem and a narrow, more or less grass-like leaf, whereas other forms of narcissus have a flat strap-like leaf. And yet most of our florists incorrectly call all narcissuses jonquils.

And then come the tulips overlapping the narcissuses. First the early flowering varieties that for some reason are too often overlooked, espe- (Continued on page 192)

★ Conservation ★

A part of Nature Magazine each month is devoted to the expression of practical opinions on the vital issues affecting our use and abuse of natural resources, including wildlife, and dedicated to the purpose of assisting Americans to play a militant part in the attainment of constructive conservation aims.

★

ND STILL WE IAVE AN OPEN UCK SEASON

"They kept plenty of ducks on hand to make up the balance, as many rich sportsmen came there and kicked if they paid 0 and didn't have the limit. . . . He said I would have get acquainted before I could get any real shooting, they were baiting and using live decoys and had to be eful about strangers. . . . The pond in front of my nd had been baited. . . . C— said he always baited e in the evening. . . . Of course, no one used a plug pt when coming and going. It is taken out and put in pocket when shooting, unless a stranger approaches, n it is slipped back in. . . . Gave us five wooden de- and one live one for a caller. . . . If the warden me around, we were to shoot the one live decoy, so re would be no evidence. . . . Had three guns with , all of which he apparently kept loaded—a pump a double-barrelled 10-gauge and a double-barrelled gauge. . . . Between us we got 44 ducks. I asked C— ut the matter of exceeding the limit, and he said, hen you get 'em flying, you keep on shooting until you out of shells! . . . They were getting about a dollar a dollar and a quarter a pair, and were shipping them by a private car. . . . His all went to regular customers, st of them being private individuals and clubs. . . . y took out live decoys to their blinds. . . . They were using unplugged automatics. . . . Later on in January through February they said the market for ducks was ter, and they would have more on hand then if I nted some. . . . Reports of the natives say that some of big shots who come down to the clubs have shot as ny as 125 ducks in a day, and let the club manager get of them through the local men who are selling ducks."

The above paragraph is made up of plain statements fact describing the gross violation of the law in the esapeake Bay region in the State of Maryland. These statements are taken from the necessarily anonymous report of a duck hunter in a startling and instructive pamphlet, "Ducks for Tomorrow?", published by the National Association of Audubon Societies. This report from the shambles of the eastern shore of Maryland is supplemented by reports from the Mississippi Valley region and from California, made respectively by Nash Buckingham, widely known sportsman, and W. Lee Chambers, sportsman, arms and ammunition dealer and ornithologist.

In publishing this pamphlet, the Audubon Association, of course, renews its demand for a closed season on our ducks and geese. The American Nature Association, which has been urging the closed season for several years, naturally whole-heartedly endorses this demand. Yet shortly after this editorial becomes public property regulations presumably will be issued for an open season along the general lines of 1936. Again a minor group with influence will prevail. Again the destructive violations described in the pamphlet under discussion will take place. And again the Roosevelt Administration, for all its much-vaunted interest in conservation, will have failed the most sorely beset of all our wildlife groups.

And real responsibility lies elsewhere also. The so-called Fish and Game Department of Maryland, among others, has long been among the worst enemies of our ducks. In this connection we quote three significant paragraphs from the Maryland report:

"My experience in the Chesapeake leads me to the inevitable conclusion that the Maryland state wardens must be fairly cognizant of what is going on, and cannot be under any pressure from the chief game warden to enforce the Federal regulation relative to hunting or marketing of ducks. The fact that the..... County district deputy game warden, A—, recommended four men, three of whom I found to be flagrant law violators, certainly bears this out. Also, never did any of those I came in contact with express any fear of the state men, but only of the Federal wardens.

"When one considers that the average layman thinks nothing of trapping and selling ducks when he can, and does not buy a license, any further regulations are of no significance whatsoever. The only solution to the duck conservation problem on

the Chesapeake Bay marshes would seem to be closed years every so often, during which the possession of ducks or of a gun in the marshes would subject one to a heavy fine. Guns capable of ever shooting more than two shots must be outlawed entirely to accomplish the end now desired by plugging, a universally evaded regulation. . . .

'It would seem to be an anomalous state of affairs, that the shooting of ducks and geese should be such a highly commercialized procedure, there literally being no place that one can hunt ducks on the Chesapeake without paying the marsh owner a fee, or participating in ownership by belonging to a duck club, while the shooting of upland game is today still largely free from commercialization. In the case of the waterfowl shooting, the owner of the marsh, who universally exacts a toll from the hunter, contributes not a thing toward the maintenance of a supply of ducks, and even competes with the hunter he charges by trapping himself on the same marsh, and encouraging hunters in any number of unsportsmanlike procedures."

Anomalous it is, indeed, and violations, commercialism and all sorts of unsportsmanlike practices are reported as well by Mr. Buckingham and Mr. Chambers in their territories. Out-of-season shooting, gunning from motor boats, use of unplugged guns, before- and after-hours shooting, baiting and use of live decoys were prevalent in the Mississippi Valley region. One significant paragraph from Nash Buckingham says:

"It is failure to deal with major problems, a perhaps outmoded system ably conceived before our era of vicious exploitation for our wildlife resources, that now has us punch drunk. Long suffering, clean sportsmen, rich, well-to-do and poor, are at the mercy of the duck-shooting racket that 'pays off' at the expense of basic waterfowl crops, contributes nothing to their restoration, and kills every vestige of good shooting and initiative in the hunter. The whole process is erosive, and, unless corrected, amounts to shooting down a bevy of quail to the last bird."

We move on to California and find that Mr. Chambers reports sadly reduced numbers of birds. One third of the ducks killed, according to the estimates of game wardens, were illegally taken. He finds that only about two per cent of the hunters know what kind of a duck they have killed, and that "the great majority of the hunters do not care what they shoot as long as a game warden is not around."

Mr. Chambers says in opening his report that he has probably sold, since 1897, as much duck ammunition and shotguns as any one person in America. His firm, he says, would suffer from a closed duck season in 1937, "but we would suffer a lot more if all our seed ducks should be wiped out at present, and there would never be any more duck hunting for anyone." Finally, Mr. Chambers concludes with the declaration that a closed season "is essential to save enough breeding birds to restock our duck preserves."

In this Audubon Association pamphlet we have three noted duck hunters saying the things that those of us who are interested in ducks for themselves have been saying for several years. We have been called sentimentalists, prohibitionists, and a number of other choicer names, for sounding warning. Now the chorus swells. The decent sportsman joins in the plea. The ignorant one kicks to his Congressman. The high-placed one with private shooting grounds and a private line to the e[ar] of the powers-that-be says nothing publicly but sees th[at] the season stays open.

However laudable, the Government program of r[e]storation of breeding places in the United States cann[ot] have much effect for several years and will then benef[it] only a small proportion of the ducks and geese, 85 p[er] cent of which breed in Canada far away from our ma[n] developed refuges. So it seems so utterly simple as n[ot] to merit argument that the only method to save an[d] restore the breeding stock is to declare closed season[s]. With the list of flagrant violations so generally practice[d] before us, it seems equally obvious that it would be f[ar] easier to enforce a regulation the violation of which woul[d] be evidenced by the possession of a dead duck or th[e] carrying of a gun where ducks gather.

But in place of a closed season, declared by the agenc[y] charged by law with the protection of our migratory bird[s] what do we see, year after year? In a Government offic[e] that boasts an incomparable array of facts concernin[g] the waterfowl supply of North America—its wel[l] nigh boundless extent of breeding ground, its forme[r] stupendous volume, its gradual wasting, its present pit[i]able condition, the causes that have contributed to i[ts] destruction, the very names of those who in the pas[t] and even now, have used their influence to further de[-] struction, both in field and office—an array of data cor[-] cerning a group of wildlife species that has never bee[n] exceeded in completeness in any country—*what is done*

Each year we see the men charged with the adminis[-] tration of the migratory bird law, with full knowledg[e] of all the conditions, men who have helped gather th[e] data, men grown and presumably arrived at the ag[e] of discretion, dilly-dallying, writing press releases, as[-] sembling squadrons of motor boats, airplanes and caval[-] cades of automobiles twice a year to count the waterfow[l] in a pitiful attempt to convince themselves and thei[r] masters that enough ducks and geese remain to justif[y] another season of killing. Each year we see assembled thos[e] who, in some capacity or other, are supposed to guar[d] our waterfowl and other wildlife resources from thei[r] enemies, conferring, haranguing, planning, talking o[f] conservation and education, proposing everything, *excep[t] less killing*. Here are assembled those who, like puppets[,] act for those behind the scenes. We have seen them a[t] game conferences for years, and this year we saw then[] at the Wildlife Federation. Yes, we even saw some o[f] the very ones who permit the practices that are revealed in the report we now discuss. And to us they seemed too well-satisfied to promise any help for the birds.

Truly it is a pitiful spectacle. May some of us live to see the gathering of men who have the courage to do what they know is right, to demand regulations that will make such a report impossible and unnecessary.

And remember that our waterfowl will not be saved by a few small refuges, by the duck stamp, or by a tax on the shell that is to kill the bird it is made for. If they are saved, it will be by placing honest, fearless men in our law-making bodies and other places of power.

At the Atlantic City meetings of the national scientific societies, in December, 1936, the American Society of Zoologists and the Ecological Society of America each passed resolutions condemning the wholesale destruction of our native animals in the so-called "vermin" campaigns; and the latter society requested Albert M. Reese of West Virginia University to prepare two papers to be used to show the public the dangers of such campaigns. It was desired that one of these papers be published in *Nature Magazine*, the other in the *Scientific Monthly*. Herewith we present the article prepared by Dr. Reese.

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It's "Vermin"— Kill It

By ALBERT M. REESE

Illustrated by Russell O. Berg

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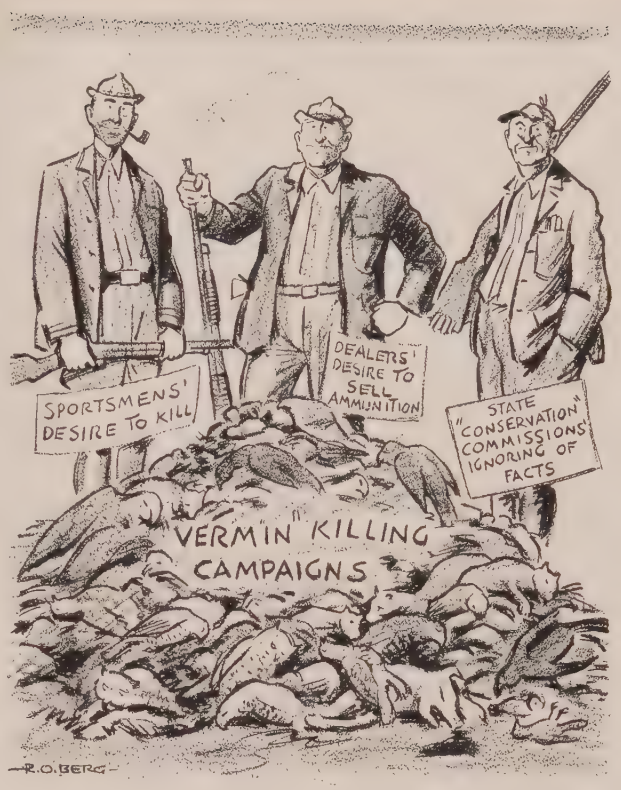
THE designation "vermin" for some of our most attractive and interesting animals is largely confined to groups of sportsmen, and to others, financially interested in killing for sport. Perhaps the term originated among the game-keepers of the large, private, hunting estates of England. Some of these keepers had the most absurb ideas as to what constituted "vermin"; for example, one keeper killed all song birds and destroyed their nests because these birds ate the food of the pheasants; another destroyed a heronry during the nesting season because their cries disturbed the pheasants.

Perhaps we do not go to such extremes in this country, but in many, probably most, cases animals get on the "vermin" list on quite meager and insufficient evidence. A sportsman or a farmer happens to see a blacksnake destroying a quail's nest. He gets a story in the local press. Perhaps another sportsman has seen or heard of the same event. Nothing is said of the value of many species of snakes to the farmer, nor of their interest to Nature lovers, but all are put on the blacklist and a price is on their heads. The average sportsman neither knows nor cares about the opinions of those who have made long and careful studies of the habits of snakes. Much the same type of reasoning applies to our attitude toward the hawks, owls and other "predators".

One aspect of the wholesale destruction of "vermin" that few but trained naturalists appreciate is the disturbance of the "balance of Nature"; the "web of life".

Perhaps Francis Thompson was using a little poetic exaggeration when he wrote:

All things by immortal power
Near and far,
Hiddenly



THE THREE MUSKETEERS

To each others linked are,
That thou canst not stir a flower
Without troubling of a star.

But, as a well-known conservationist has said:

"We should note that among the essential items in maximum and diversified wildlife production are the weed trees, the miscellaneous brush, the over-mature trees, the standing dead snags, a variety of herbaceous plants, the rodents, the snakes, the insects, the hawks, owls, fur-bearers, and predators."

Numerous examples could be given of the serious results of the wanton destruction of certain animals, or the thoughtless introduction of species into new localities. As an example of an unexpected relationship, a case given by Sir Arthur Thompson will be quoted.

"There is an Australian story which reads as if written for man's instruction. In certain Murray River swamps several species of cormorants used to swim in thousands, but ruthless massacres, based on the supposition that the cormorants were spoiling the fishing, reduced them to hundreds. But the fishing did not improve; it grew worse. It was then discovered that the cormorants fed largely upon crabs, eels, and some other creatures which devour the spawn and fry of desirable fishes. Thus the ignorant massacre of the cormorants made for the impoverishment, not for the improvement, of fishing. The obvious moral is that man should get all the facts of the web of life before, not after, he has recourse to drastic measures of interference."

Somewhat similar effects may result from the destruction of our fish hawks, as it is stated that most of the fishes destroyed by the ospreys are not only not game species, but are often harmful to them. The balance of life is

often more delicate than is generally realized.

As stated by the Federation of Ontario Naturalists (Publication No. 2) there are three main groups of people interested in the preservation of wildlife in Canada, and the same classification would hold, with some change of emphasis, in the States:

"1. Isolated settlers and natives of the North, for whom the wildlife is an important element of their livelihood, either as food or on account of the fur produced.
2. Sportsmen, who hunt and kill animals, birds and fish for pleasure.
3. Those who enjoy the contemplation and study of Nature for aesthetic, recreational and educational reasons."

THE POWER THAT COULD STOP THEM

In many States of the Union the first group is of insignificant size, certainly so far as the use of wild animals for food is concerned, and in most States the second group is far outnumbered by the third. We who belong to the third group cannot see the justice of permitting the second group to destroy animals by the millions in order that its members, the sportsmen, may enjoy killing certain game animals.

As a matter of fact, it seems certain that the destruction of the so-called "predators" has little, if any, effect in increasing the numbers of game animals. Dr. Paul Errington and others have made careful studies, extending through a series of years, which seem to prove that the proper environment is much more important than the absence of predators. Where proper cover is provided an area will carry its maximum population of, say, quail, regardless of the presence or absence of predators. If sportsmen would expend their funds and energies in improving the game covers instead of trying to destroy the "vermin", much more abundant game would result. Where cattle, sheep or fires are permitted to destroy all grass, shrubs and other low vegetation, most forms of game have little chance of escaping their enemies, even if they are able to secure sufficient food during the winter.

It is hoped that the "vermin" killers will learn something of the "web of life" from the conditions in some of the National Parks and game preserves that have been and are being established in various parts of this and other countries. To us non-killing Nature lovers it gives great satisfaction to think of these sanctuaries where all kinds of animals may live their normal lives without fear of hunter and "vermin" killer.

In the Kruger National Park in South Africa a pamphlet is distributed to tourists, according to the Federation of Ontario Naturalists, which suggests, among other things:

"If you find lions standing or lying in the middle of the road in front of you, it is not necessary to do more than slow down; when you get close they will get up and move to the side out of your way. But don't get within a hundred yards of a lioness with small cubs. She will think you mean to harm them, and may take steps to prevent you from doing so. Stop your car until she has got her cubs away, when she will quickly follow them. Don't forget that if you fire and wound a lion or lioness, you are making unnecessary trouble for yourself."

Few people realize the enormous numbers of animals that are annually slaughtered in the "vermin" control campaigns.

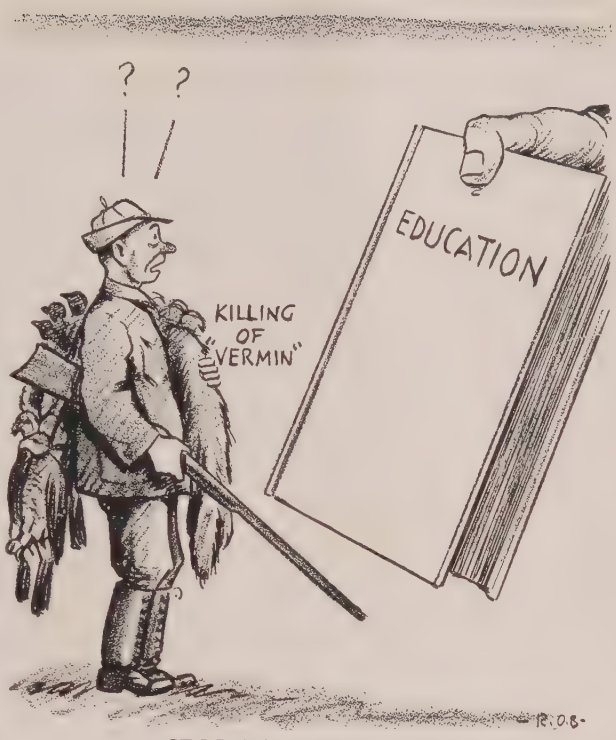
The campaigns are usually sponsored by the various rod-and-gun clubs or other groups of sportsmen. Unfortunately they are frequently officially recognized and encouraged by State conservation commissions and similar organizations. For example, one rather small eastern State not only offers bounties on certain animals but donates $40 to each county campaign that accounts for a certain number of animals on the proscribed list. In this State there were about 32 "vermin" contests in 1936, usually one for each county. This year, 1937, 40 of the somewhat more than 50 counties have organized campaigns. Prizes of all sorts are offered by local firms and individuals, the most common being guns, ammunition and fishing tackle by dealers in ammunition, who chiefly benefit from the sportsmen's activities. Passes to a local movie theatre may be offered, and even a year's scholarship for the local college is on the list of prizes in one community.

With such inducements, added to the pleasure that some people take in killing, it is no wonder that the numbers of animals killed reach such startling figures.

According to a bulletin of the U. S. Biological Survey, issued November, 1935, 28 States pay bounties on certain birds or mammals or both. The highest bounties paid that year on mammals was as follows: bears, $20; adult wolf, $50; wild cat, $20; gray fox, $5; mountain lion, $50; woodchuck, $2; weasel, $1.

Publication No. 59 of the Emergency Conservation Committee gives the following figures for the animals

killed in "vermin" contests in "an eastern State, in 1935": gray fox, 1700; weasel, 2900; wildcat, 188; mink, 404; house cat, 8410; crows, 19,616; kingfishers, 1546; snakes, 184,702; carp fish, 331; rats and mice, 115,016; hawks, 7270; owls, 3123; waterdogs, 14,571; gars, 462; blackbirds, 783; sparrows, 3936; turtles, 21,566; shitepokes, 42; ground squirrels, 69,780; eagles, 4; groundhogs, 1203; eggs (snake, crow, hawk, and owl), 1308; terrapins, 28,572; starlings, 19,186; red squirrels, 7606. TOTAL, 514,225.



STOP HIM WITH THIS!

A total of considerably more than half a million in one State is quite a reduction in our animal population. Note that one of the largest items was "ground squirrels", which, in an eastern state, doubtless means chipmunks, one of our most attractive wild animals. In another eastern state more than 18,000 chipmunks were killed last year. Except for an occasional theft of corn in the field, no sportsman has been able to tell me of the damage done by these charming little animals.

It is also to be noted that hawks, owls, eagles and snakes are, apparently, killed indiscriminately. As a matter of fact, so few hunters know the hawks apart, that, unless all are protected, as they should be, except in individual cases, it is hopeless to protect some and put a bounty on others.

What can be done to stop this senseless destruction of our wildlife? Perhaps a campaign of education such as is being conducted by the Emergency Conservation Committee under the chairmanship of Mrs. C. N. Edge, 734 Lexington Ave., New York, by Nature Magazine, and by numerous individual conservationists, is the best way of correcting the evil.

Probably the State conservation commissions, if they would, could do more than any other one agency to end the slaughter. Unfortunately, many of them favor the continuation of "vermin" control. Campaigns, in some cases, as has been said, actually are given financial support by the commissions.

An inquiry sent to about three dozen State commissions or surveys showed that of twenty-seven who replied nineteen were in favor of "vermin" campaigns. With a majority of the State conservation commissions in favor of destroying "vermin" the prospect of help in that direction does not seem bright.

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SAVING OR SHOOTING ★

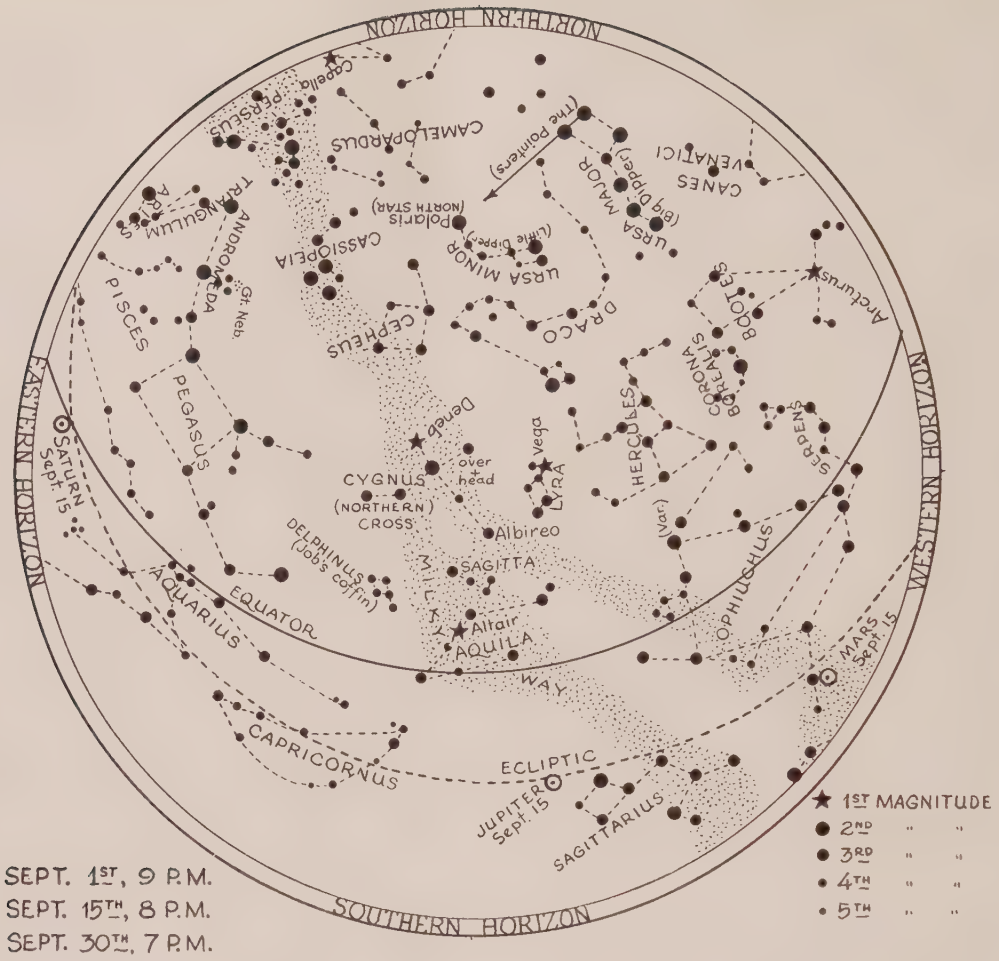
In a recent publication by a sportsman's organization, we read that, "There are numerous opportunities . . . of saving thousands of ducklings in distress, and of preventing serious waterfowl losses from epidemics. . . . Certainly, something could be done also to reduce the number of destructive crows and to lessen the grazing evil."

At their face value these words embody a chiefly meritorious appeal, but when the general conservationist realizes that the words are those of an organization the main purpose of which is to hold and to increase hunting privileges they assume quite a different aspect. In the name of real conservation it may be inquired what good is there saving thousands of ducklings from destruction by crows, lack of cover, and drought, if they are saved only to be shot. The true conservationist works for the preservation of wildlife itself, not for that of so-called sport exploiting wildlife. He would gladly sacrifice to save waterfowl or other forms of wildlife for their own sake, but not to cater to the killing propensities of hunters.

The pamphlet from which quotation has been made further says: "A waterfowl crisis is imminent." It does not say, however, what is perfectly obvious, that this crisis would not threaten the existence of waterfowl if hunters would give up killing. The conservation of waterfowl could be assured by that single step if the refuge program of the United States and of the Canadian government is continued and carried out as planned.

Hunting is justifiable, if at all, when it is practiced on a temporary surplus and when it does not cut down the average population of the creatures affected. It has been a long time since this condition obtained in the case of wild fowl, for under pressure from various adverse factors their total numbers have long been steadily and alarmingly decreasing.

The most direct and effective way to preserve wild fowl is to stop killing them. Then in the course of time, if productive measures can restore their numbers and provide a surplus, possibly hunting might again be tolerated. Tolerance is all that sport can expect from real conservationists, however, and its crocodilian plea for saving ducklings that they may grow up to be shot is not one likely to arouse sympathy for the gunner.



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

What's Happened to the Martian Atmosphere?

Strange phenomenon observed by scientists at Lowell Observatory may be due to sunspot activity

By ISABEL M. LEWIS

It was on May 20 and 21 of this year, when the ruddy planet Mars was just past opposition with the sun, and about a week before its closest approach to the earth for this return, about 47,200,000 miles, that a most remarkable change in the atmosphere of the planet was observed at the Lowell Observatory at Flagstaff, Arizona. So important did Dr. E. C. Slipher of the Observatory consider the photographic records of the phenomenon, that he calls attention to it in an article, illustrated by photographs of the observed change, in the June number of the *Publications of the Astronomical Society of the Pacific*, that other astronomers might be on the watch for further developments.

Photographs of the planet taken in blue and violet light had shown, until the change was recorded, the usual characteristics of such photographs: cloudiness and veiling of the surface features of the planet by its atmosphere. Then suddenly, within a few days, a remarkable transparency in the Martian atmosphere was observed over an enormous area. It manifested itself in the photographs taken in blue light as huge dark regions, breaks in an atmosphere normally opaque to the short blue and violet wave-lengths of light, through which dark markings on the surface of the planet could be seen.

Photographs in blue light usually show little if any trace of the surface features of the planet such as appear in photographs taken in yellow light that readily penetrates the haze that shuts out rays of shorter wave-length. So remarkable was the change recorded in the blue-light photographs that they might have been assumed upon a

first glance to be photographs taken in yellow light.

According to Dr. Slipher, no change so remarkable as this phenomenon has been observed in the atmosphere of Mars during the many years that photographic records of this planet have been kept at Flagstaff. It indicates a state of most unusual transparency in the Martian atmosphere over a great area. Comparisons of the photographs were made with similar ones taken in blue light in previous years as far back as 1922 and show that the Syrtis Major, the largest and most conspicuous of all markings on the surface of Mars, may be seen more clearly in the photographs taken at this opposition in blue light than at any earlier time for which there is a comparable record.

Blue photographs made on the same type of plate on April 20 of this year show no trace of the Syrtis Major but rather a cloudy condition of the planet's atmosphere. The same face of the planet photographed in blue light on other occasions shows almost complete screening of the surface features of the planet, due to the opaqueness of the atmosphere to blue light, while the photographs taken in May show a most unusual transparency in the planet's atmosphere over a great area.

Cloud patches were observed on other portions of the planet's disk, and in the south polar region of the planet there was a noticeable change in the size and brightness of the cloudy area between the nights of May 20 and 21, showing that the change in the opaqueness of the atmosphere occurred only in certain areas. This proved the phenomenon was not due to a condition existing in our own atmosphere since the usual cloudiness and haziness were visible over other parts of the Martian surface. As the same telescope and equipment and same kind of plates were used for all these photographs, it was evident that the change observed was due to a great variation in the transparency of the Martian atmosphere. Though variations in the transparency have been observed on other occasions, there have been none so remarkable as that of the present year. Until the reports of other observers of this planet are available it will not be known for how long this change in the transparency of the planet's atmosphere was observable or how frequently it occurred during this spring and summer. The planet now is getting too far from the earth for favorable observation of its surface features or atmosphere, and another two years will pass before the planet is well placed for such observation.

From a comparison of photographs of terrestrial landscape made in blue light through different air-paths, Dr. Slipher concludes that the opacity of the Martian atmosphere to blue light is far greater than that of our own and that it is probably surrounded by a very considerable atmosphere; one that may contain a great amount of finely divided matter that scatters and absorbs to a great extent the short wave-lengths of light (the blue and violet rays), or it may be that its atmosphere contains some unrecognized constituent which peculiarly modifies the incident light.

One wonders if the great meteorological change over a great portion of the Martian surface indicated by the observations made at the Lowell Observatory in May may not be connected with the great sunspot activity that has taken place this year. That there is a connection between the cycle of sunspot activity and certain atmospheric phenomena observable on the planets Mars, Jupiter, and Saturn has been suggested frequently. Is this possibly an instance of the effect of increased solar activity, of which the increase in the number and size of sunspots is one manifestation, upon the atmospheres of the planets? We have ample proof that sunspots have an effect on the earth's atmosphere, producing magnetic storms, auroral displays, and an excess of ultra-violet rays. The atmospheres of the other planets probably would not be immune to the effects of these changes in solar activity even though the composition of their atmospheres is different from that of the earth.

Jupiter's Great Red Spot undergoes great fluctuations and changes in color. The intensity and color of the many spots on the giant planet's surface are constantly undergoing changes, and there is reason to believe that many of these changes in the brightness and color of disturbed areas in the planet's atmosphere are affected by sunspots and the radiations that emanate from them. Similar changes in the atmosphere of Saturn have been noted, particularly in the color and brightness of certain areas. It may be worth while for those who have telescopes and are interested in observing the planets Jupiter and Saturn to keep an eye open for any atmospheric phenomena of an unusual nature that may occur, such as the appearance of remarkably bright or dark areas or changes in color or intensity of spots or belts.

Mars, Jupiter, and Saturn are all in the evening sky this month. Mars is in quadrature on September 10 and will be found due south on that date, in Ophiuchus, a few degrees east of Antares. It is now of zero magnitude, decidedly reddish in color, and slowly decreasing in brightness as its distance from the earth increases.

Jupiter is in Sagittarius, and though rather low in the southern sky in northern latitudes, it is well placed for observation in the evening.

Saturn is in Pisces and will be in opposition with the sun on September 25, when it will rise at sunset and remain visible all the night. It is yellowish in color, and about equal to Altair in brightness at this time.

Venus and Mercury are both morning stars this month. This is the best time of the year to observe Mercury in the morning sky, at the time of greatest western elongation, which will occur on September 30. The planet should be easily observable for a week or so before and after that date. It will be about eighteen degrees above the southeastern horizon at sunrise. Venus is now slowly drawing in toward the sun and rises about three hours before it. During the month it passes from Cancer into Leo.

Autumn will begin on September 23 at 6:13 A.M., Eastern Time, when the sun will cross the equator going south carrying spring to lands below the equatorial line.

Nature Magazine in School

A Department of Aid to the Teacher

Our Noblest Deer

This splendid article by Vernon Bailey gives an historical background to the subject of conservation without which it is impossible to understand the present attitude of the American people toward this vital question. In studying about the early pioneers, a list could be made of the animals that supplied food and clothing. In order to kill these animals the pioneer had to know much of their life history. A class could study the life of any one of our great pioneers, who, almost bare-handed, wrested a living from forest and stream, illustrating man's struggle without the aid of civilization. In such a unit one could visualize the attitude of the people at that time toward all wildlife, a typical instance of which is given by William T. Hornaday in his book, *Our Vanishing Wild Life*. In this book there is a quotation of a report made by a committee to the Senate of Ohio in 1857, as follows: "The passenger pigeon needs no protection, wonderfully prolific, having the vast forests of the North as its breeding grounds, traveling hundreds of miles in search of food, it is here to-day and elsewhere to-morrow, and no ordinary destruction can lessen them."

The same attitude of mind, held in regard to the elk, is largely responsible for its extinction in the East and its almost entire destruction in the West. Using this article, a series of dated maps could be drawn showing the location of the elk for the past two hundred years. Estimates could be made of the extent of territory needed for a limited number of elk and this could be compared with the acreage actually provided in our National Parks for the same number.

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Westward Ho! For "Red Sally"

Species introduced into new environments prosper and multiply beyond all expectation, hence the danger. This is an example of a species that, because of its beauty, is not unwelcome. Pupils might list others, such as the Japanese honeysuckle, that have become positive pests. In the consideration of the "web of life" the introduction of a new species constitutes one of the major disturbances attributable to man. Pupils could describe some of the consequences to other forms of vegetation when a particular species gets out of control. They could read about the struggle that the people of Australia have had to raise crops and gardens in competition with the introduced cactus.

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A Trumpeter of the Marshlands

Pupils always delight in telling of their experiences during summer vacations. Some of them will wish to tell of the different kinds of birds they have seen. At such a time this article could be read. The whooping crane was once a familiar sight in migration over much of the eastern part of the United States, and bred from northern Mackenzie and Hudson Bay to Illinois and Iowa. Pupils who have vacationed in any part of this region might have had the experience of seeing this largest of American birds, had it not been for its ruthless destruction.

In order that teachers and parents may further use Nature Magazine as an aid to the study of Nature and Science, this page is devoted to the following brief notes based upon articles in this issue and suggesting ways in which they may be used as a source of inspiration and information. To bring these Nature study thoughts to our readers we have obtained the services of one eminently qualified for the task, and this department is edited

BY ESTHER SCOTT

Instructor in charge of Elementary Science
Washington, D. C., Schools

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These Ten Trees

This article gives an approach to the forestry unit, which is a vital part of a well-balanced science course. This unit might be introduced by a debate on the relative value of trees. Before reading it pupils could set up criteria upon which to judge the relative merits of different trees, and then list ten or more trees that they considered most important. The discussion following would bring out the economic value of trees, an important aspect of forestry. Other phases might be developed, such as the pleasure that man derives from the woods, by having a picnic there; the types of plant life in a forest, by making a sand-table representation of the several layers of plant life; trees, bushes, miscellaneous wild flowers, mosses, bacteria, and the various types of wildlife associated with each, learned by reading their life histories and working out the dependence of the species on the plant life.

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TEACHING CONSERVATION

Some time ago we announced a plan to publish a special American Nature Association bulletin designed to assist the teaching of conservation as a school subject. There have been inevitable delays in connection with this but the bulletin is now available to members of the American Nature Association for a three-cent stamp to cover mailing, and to others at twenty-five cents a copy. It may be obtained from the American Nature Association, 1214 16th Street, Washington, D. C. The title is "Teaching Conservation", and it is Conservation Bulletin Number 3. This 32-page bulletin is not designed to present a course of study but to be generally suggestive of methods and of inspiration to teachers.

Our Unstable Shores

Pupils should realize that the powers of man to control his environment are limited, especially in the face of the forces of the sea. They could assemble data showing the extent of coast changes in a single storm, and drawing a map to illustrate the line of the coast before and after a storm. They can find out what parts of our shores are slowly sinking beneath the water, and what parts are rising. This article, as well as "Guideposts of the Sea" in the June issue, deals with the importance of the work of the Coast and Geodetic Survey.

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The Peyote and the American Indian

This story of the use of the peyote as a religious sacrament serves to introduce the subject of Indian culture. We could learn much from the native American. No study of conservation would be complete without a consideration of the attitude of the American Indian toward wildlife in general. His attitude toward a camp fire, expressed in the saying that the Indian makes a little fire, cooks his dinner, while 'the white man makes heap big fire and cooks himself', is not without its moral. Much school time is profitably spent in studying how the Indian hunted, fished, farmed, traveled, made his home, cooked his food, and what he believed. To the extent to which pupils really live the lives of the Indians, their appreciation of them would be measured. For this reason, they should build Indian tepees, make canoes, cook Indian food, and learn the woods lore as the Indian knew it. Through such an experience pupils should be led to view the subject of conservation as the Indian saw it, and then formulate a policy of conservation that the white man would do well to observe.

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The American Bowfin

In schools throughout the land, teachers are making plans for their aquaria. What kind of creatures shall be included? What kinds of fish thrive in an aquarium? What are the best varieties of plants to use? How shall these be planted? How soon after the water is put in should the creatures be introduced? What about temperature?

An excellent unit of work could be centered around a balanced aquarium. Pupils could read the life histories of several kinds of fishes to decide which kinds they would like to have. By experimentation, they could determine the relative number of fishes, scavengers and plants to keep it balanced, and in doing this they would be having real experience with the important problem of the interdependence of living things.

By reading this article pupils could decide whether or not the American bowfin, with its remarkable breathing machinery, would live in an aquarium and if it would be a desirable resident there. In regions where it is possible to get a small bowfin, it would be in-

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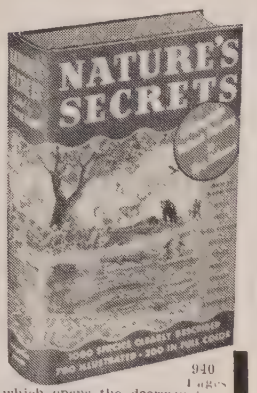

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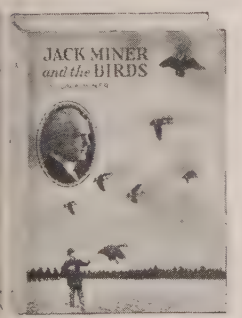
JACK MINER
AND THE BIRDS



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teresting to try keeping it in an aquarium. By the use of the illustrations in this article comparisons could be made between the position of the fins and the general shape of the body of this species, and others, such as goldfish.

•

Wild Goose Haven

This is an excellent conservation story, telling how two men changed their point of view from that of the hunter to the friend of wildlife. It is a good illustration of the effect of a captive wild creature upon the human being responsible for its care. It is through our regard for these pets that children, as well as grown-ups, are led to a deeper, more sincere feeling toward living creatures.

Older pupils could make a map of the United States, coloring the areas devoted to the protection of water fowl. By comparing their state with the rest of the country they could tell at a glance where their own state stood in this respect. The relative effect of those refuges on the birds by the varying status of the various species through the years could be studied, and opinions formed of the efficacy of sanctuaries and other forms of protection.

•

It's "Vermin"—Kill It

The issue raised in this article is one no patriotically-minded teacher can afford to overlook. The serious effect of the disturbance of the balance of Nature occasioned by these "vermin" hunts is far-reaching and at this time the consequences can be only dimly realized even by those who are experts in the field. The dependence of man upon Nature and the interdependence of all living things is a theme that should receive attention at all grade levels. Such a theme could be introduced by studying the life in a pond or stream. Specimens could be brought into the school room and kept in an aquarium or in jars. It would be found that one species depended on another down to the ones that ate the vegetation, and that if certain types that provide food were absent, those dependent upon them would die. Discussions should lead to some understanding of this factor in keeping species in check. With a background of observations and a list of questions, pupils could read about the life histories of their captive water creatures. Several of the Rural School Leaflets published at Cornell University are written about this subject. By studying the life of a forest as well as a pond it is evident that the living things maintain themselves for ages without any one of them getting out of control and harming the rest. Each one is dependent upon the other and the soil is the ultimate source of food for all, the whole being a wonderful balance of forces.

By beginning the subject of "vermin" through materials not of a controversial nature, an appreciation of the principles underlying the balance of Nature could be obtained, and after this there would be a better chance of the "vermin" question being rightly interpreted.

After a sympathetic attitude had been aroused individuals of the class could outline a campaign to counteract the "education programs" put on by the makers of guns and ammunition, and others interested in the slaughter of wild creatures. In rural communities much could be accomplished through the local Farm Bureaus, Izaak Walton Leagues, and the Audubon Societies.

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"I have sold, up to date, nineteen features to the Detroit Free Press and have been made their correspondent here," writes Mrs. Leonard Sanders of 218 Union St., Milford, Mich., on completing the N.I.A. course. Her skilful handling of feature stories was the reason given by the editor for her appointment. Mrs. Sanders' first feature was sold less than four months after she enrolled with N.I.A.

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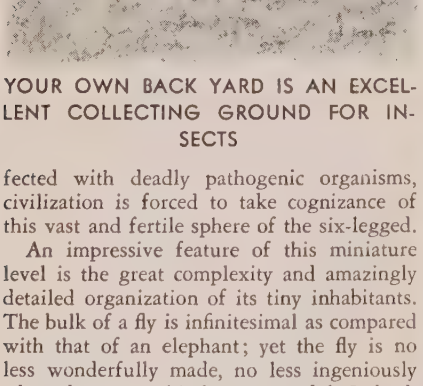
THE MINIATURE WORLD

Far above the size level of the microcosm which was discussed last month, and yet far below that of man and his familiar animal associates lies the intermediate world of the insect. Here is a stratum of life that carries on under our very noses and of which most of us would take scant notice were it not that their interests frequently run counter to our own. When crops and forests are destroyed, food and clothing damaged, and man and his domestic stock plagued and in-



YOUR OWN BACK YARD IS AN EXCELLENT COLLECTING GROUND FOR INSECTS

fected with deadly pathogenic organisms, civilization is forced to take cognizance of this vast and fertile sphere of the six-legged.

An impressive feature of this miniature level is the great complexity and amazingly detailed organization of its tiny inhabitants. The bulk of a fly is infinitesimal as compared with that of an elephant; yet the fly is no less wonderfully made, no less ingeniously adapted, nor a whit less successful. Indeed, if success is to be judged by numbers and world-wide distribution, then flies are eminently more successful than elephants.

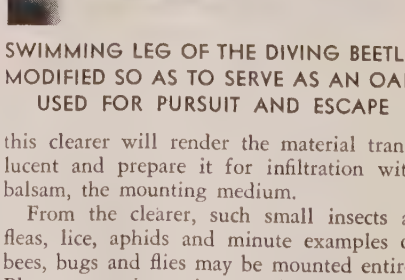
Insects occur practically everywhere and can be found at any time of year. Getting by the winter months in northern latitudes is a great problem for all animals, and insects have in the main solved it by passing this season in one of their immature stages—eggs, larvæ or pupæ—safely stowed away underground, in water, in cracks and crannies, beneath bark, leaves and trash, inside the bodies of other animals.

Spring finds these undeveloped arthropods coming to maturity and reproducing; summer continues adult activities and by autumn the heyday of the miniature world is reached, with the young of one or many summer generations themselves attaining maturity. Autumn woods and fields abound with insects of every description, and collecting material for mounting during the winter months is one of the best September employments for the microscopist.

A net and a bottle of alcohol of about 70 to 80 percent strength are all that one needs in collecting specimens intended for slide work. Sweep the net through grass and weed fields, with an eye out for brambles that would tear the net bag to pieces; hold the net open below a shrub which can be shaken vigorously by hand; bring the bag down smartly from above upon butterflies and bees that have alighted on plants; turn over fallen logs, flat stones, old tins and tar paper in woods and fields and junk heaps; swish the net through water along the bottom in ponds and small streams—these are some of the commoner methods of collecting.

Specimens are removed from the net by hand or by turning the bag slowly inside out over the mouth of the bottle, forcing the captives into the alcohol. Many forms, especially bugs and beetles, may be picked from weeds and flowers by hand, without using the net at all. Milkweed, butterfly weed, goldenrod and Queen Anne's lace, abundant field plants almost everywhere, will be found especially prolific in their insect faunas. Beneath cow dung and carcasses occur burying and carrion beetles and fly maggots, while one must not overlook the possibilities of rich rewards in handpicking external parasites from birds and mammals—the all too plentiful lice, fleas, mites and ticks—the last two belonging to the spider group.

Whenever it is desired to make slide preparations from these collections, transfer material to full strength alcohol for one to three hours or even overnight, duration depending on size and density of the specimen. This completes the process of *dehydration,* the extraction of all water from organic tissues. *Clearing* comes next, the subjects being placed in a small glass vessel containing carbol-xylol, made by combining one part of melted carbolic acid crystals (caution! very poisonous!) with three parts of xylol (xylene). A stay of one to several hours in

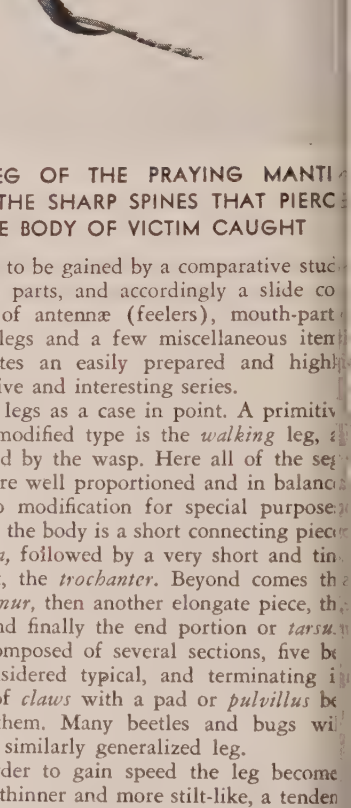


SWIMMING LEG OF THE DIVING BEETLE, MODIFIED SO AS TO SERVE AS AN OAR. USED FOR PURSUIT AND ESCAPE

this clearer will render the material translucent and prepare it for infiltration with balsam, the mounting medium.

From the clearer, such small insects as fleas, lice, aphids and minute examples of bees, bugs and flies may be mounted entire. Place a specimen in one large drop of balsam on the center of a thoroughly cleaned slide, apply a cover glass gently, and put the finished slide away in flat position to dry for a few days or a week until the balsam has hardened. Thick mounts require cove glass props to prevent crushing or distortin the object and these are best made by breal ing up a glass slide with a hammer an using small fragments as props, placing thr or four spaced around the cover gla periphery.

With the majority of insects it is neith possible nor desirable to mount the enti animal; much more information of re



FORELEG OF THE PRAYING MANTI NOTE THE SHARP SPINES THAT PIERC THE BODY OF VICTIM CAUGHT

value is to be gained by a comparative stud of their parts, and accordingly a slide co lection of antennæ (feelers), mouth-part wings, legs and a few miscellaneous item constitutes an easily prepared and highl instructive and interesting series.

Take legs as a case in point. A primitiv and unmodified type is the *walking* leg, a exhibited by the wasp. Here all of the seg ments are well proportioned and in balanc with no modification for special purpose Next to the body is a short connecting piec the *coxa,* followed by a very short and tin segment, the *trochanter.* Beyond comes th long *femur,* then another elongate piece, th *tibia,* and finally the end portion or *tarsu* itself composed of several sections, five be ing considered typical, and terminating i a pair of *claws* with a pad or *pulvillus* be tween them. Many beetles and bugs wil show a similarly generalized leg.

In order to gain speed the leg become longer, thinner and more stilt-like, a tenden cy that will be recognized when the *runnin* leg of the horse is contrasted with th walking leg of the bear. The third leg o the roach is a fine example of this adapta tion among insects. *Leaping* requires tre mendous muscular development for the sud den and powerful spring, as seen in th rabbit and frog and among insects in th third legs of grasshopper, cricket and flea where the femur is greatly developed t house its enlarged muscles. These insect leg also exhibit an adaptation for *climbing* it the downward pointing spines, used as th telephone linesman employs his climbing spikes. The house fly leg shows a large pulvillus which produces a sticky secretion and permits climbing on flat and smooth surfaces, even walking on ceilings, upside down.

A modification very necessary to external

parasites is *clinging,* and the forelegs of either human or hog lice show a very ingenious arrangement of thumb and mitt for this purpose. *Grasping* as an offensive measure for the capture of prey is a specialty with the mantis, where the first leg is equipped with long sharp spines and closes like a vise on unwary victims which are pierced through in this deadly grip. *Swimming* legs row like oars and reach their best development in the third leg of diving beetles, flattened and fringed with long hairs for this function. The foreleg of the mole cricket is the outstanding example of the *digging* appendage, with all parts highly modified toward a superficial resemblance to the arm of a true mole.

Each of the three legs of the honey bee exhibits many specializations for the complex work it is called upon to do, and should be included in the slide collection on this subject. Other insect parts could be discussed in similar fashion if space permitted, but enough has been given to explain the method and purpose as well as the fascination of this work.

THE RAT FLEA, ONE OF THE CARRIERS OF BUBONIC PLAGUE. ALL PHOTOMICROGRAPHS FROM WARD'S NATURAL SCIENCE ESTABLISHMENT

BEGINNER'S PRIMER

Here are the more important rules for the correct use of the microscope:

1. Always *keep both eyes open* when looking into the microscope. This is not easy to master, but is important and should be practiced daily until proficiency is attained. Keep at it in small doses; for a while you will see nothing, then the object, then the table and so on. But it will come in time and is essential to do away with squinting and strain on eye muscles.

2. *Alternate* the use of the two eyes—left then right—for not longer than ten minutes each at any one time. This prevents unequal strain.

3. Alternate looking through the microscope with *other* occupations, as reading, note-making or rest. Thirty minutes at a sketch is generally sufficient for most microscopic work.

4. Use the *correct light*:—too dim causes eyestrain in an effort to penetrate the gloom; too bright produces a glare that is not only harmful to the eyes but drowns out all detail of the object. Moderate light is correct.

5. *Relax* completely when looking through the eyepiece and imagine that the object is a long way off, as if viewed down the deep shaft of a well. This overcomes an unconscious effort to focus the eye and prevents fatigue. Let the adjustments of the instrument do all the work—you merely do the looking.

TRADE NOTES

Many indeed are the excellent manuals of microtechnique on the market. One of the best and considerably the cheapest for the amateur and beginner is the *Brief Directions in Histological Technique,* by Becker and Roudabush. This small book has many advantages; concise but explicit and careful directions, the standard modern techniques and main specialties without the usual bewildering array of alternatives that appear in the more encyclopaedic works, spiral wire binding so that pages are perfectly flat wherever opened, blank pages for adding notes, numerous source references. Collegiate Press, Inc., Ames, Iowa. $1.00.

Ward's Natural Science Establishment, Inc., Box 24, Beechwood Station, Rochester, N. Y., is one of the great supply houses of scientific material. They publish three monthly trade journals for different fields of interest, one of which is Ward's Entomological Bulletin. In connection with our feature article this month, they have offered to send a complete set of all the issues for the college year 1936-37, postpaid for 15c. Another item of great value in this connection which Ward's publishes is the *Directions for Collecting and Preserving Insects,* by Dr. Alexander B. Klots, a 30-page, fully illustrated booklet; 15c postpaid.

E. Leitz, Inc., of Wetzlar, Germany, whose New York offices are at 730 Fifth Ave., manufacture one of the half-dozen most famous brands of microscopes of the world, as well as the renowned Leica camera. We plan to tell you something about the great manufacturing companies in later issues. Among booklets issued by Leitz is their Student Pamphlet, containing charts with color reproductions of bacteriological specimens besides technical and commercial information regarding their instruments. Send a 3c stamp to NATURE MAGAZINE for a postpaid copy.

We are just in receipt of a useful background book, *The Living World,* by S. H. Williams. This is a guide to Nature study which describes the groups of animals and plants and tells many interesting facts about how and where they live. It does not include microscopic forms but has a great deal to say about insects and there is a chapter on how to collect and study. The Macmillan Company, 60 Fifth Ave., New York City, $3.60.

Under the Microscope is a department of NATURE MAGAZINE designed for those readers interested in microscopy and maintains a service to render assistance with problems in this field. You are invited to take advantage of this service. Address all inquiries to Julian D. Corrington, NATURE MAGAZINE, 1214 Sixteenth St., N. W., Washington, D. C.

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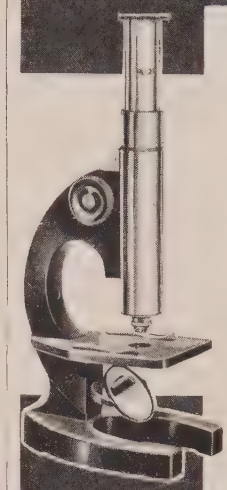

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Turtle Man

Dr. W. R. Whitney, vice president in charge of research, General Electric Company, is conducting experiments with turtles that may, in the future, give some idea as to their longevity. His country estate is a veritable turtle farm, where he has found about 275 different individuals. Each he has marked with the date on its under shell and turned loose again. If he comes upon a turtle strolling about the farm, it is examined to ascertain if it has been "dated." If so, he adds the new date and makes a notation in his turtle book. Some of the little reptiles have as many as ten dates scratched on their shell, indicating that they seem to enjoy the habitat about Mr. Whitney's farm. Future residents of the area, perhaps in many years to come, may find these same turtles and thus establish their life span.

Fauna of Canada

A pamphlet with the above title has been published by the National Museum of Canada, Department of Mines and Resources, and will interest those desiring information on Canada's wildlife. The pamphlet, reprinted from the *Canada Yearbook, 1937,* is by Rudolph Martin Anderson, Chief of the Division of Biology of the Museum, and contains material concerning the faunal zones, distribution of species in the Northwest, peculiarities of bird distribution, distribution of mammal faunas, the economic importance of wildlife assets and their conservation. The pamphlet is available from the Department of Mines and Resources at Ottawa, Canada.

North Pole on the Air

The National Broadcasting Company has arranged to broadcast once each month until August, 1938, from the MacGregor Arctic Expedition now en route to the North Pole to study weather conditions, solar radiation and the effect of the magnetic pole on radio reception. Residents in the United States sweltering in summer heat will hear the crunching of ice as the schooner *General A. W. Greely* plows through the floes. Featured on the tentative program are descriptions of the Aurora Borealis, the seals, walrus and other arctic animals. The May, 1938, broadcast will feature a description of the land as seen from an airplane flying over the pole.

Birds in Flight

Drawing on information in nearly 100 articles and books, May Thatcher Cooke of the Biological Survey has compiled a brief summary of some of the more reliable reports on the flight speed of birds. Speeds of fifty to sixty miles an hour have been recorded for mallards, Miss Cooke has found, and speeds of sixty-five and seventy-two miles an hour have been reported for pintails and canvasbacks by ornithologists using airplanes. Diving at a velocity of nearly 175 miles an hour, a hawk, presumably a duck hawk, passed one aviator "as though the plane was standing still," it was reported. Miss Cooke's compilation can be obtained from the Superintendent of Documents, Washington, D. C., for five cents cash. Ask for U. S. Department of Agriculture circular number 428.

Hummer

EDITOR'S NOTE: Miss Gertrude White, pupil of the seventh grade of the Ellwanger and Barry School, Rochester, N. Y., wrote the following letter, as part of her class work, to Mr. Harry Carpenter, who conducts the Rochester School of the Air over two of the city's radio broadcasting stations.

Dear Mr. Carpenter,

All the children of my class are writing you about their Easter experiences in connection with our science work, but as I could not think of any I should like to tell you my adventure with a little humming bird in July and August of last year.

One fine morning I was out sprinkling the lawn and admiring the greenness of the grass when I chanced to see a brightly-colored red form on the pavement. I went over to it and found that it was a humming bird. Being curious, I stooped over to look more closely at it. When it did not stir, I picked it up and carried it into my house. I went directly to my room where I set it on the window sill. Then I flew down the steps and into the garden where I picked some small flowers and some long-stemmed ones. Next I found an old bird cage. Removing the door, I lined the cage with the small flowers, replaced the thick perches with thin sticks so that the bird could get a good hold, and filled the two cups—one with sugar water and the other with honey. I also set in a few drops of maple syrup. The last thing I did was to set the long-stemmed flowers in a large vase. When I finished, I trotted proudly up the stairs showing the masterpieces to my parents and carrying a broad grin.

When I opened the door, the humming bird was "sitting on top of the world"; that is, he was napping on the very top of my world globe. Unfortunately, though, I awakened him.

After setting up the cage near a window, I set him in it to see how he would like it. He looked around, sipped the dew from the flowers and started in at the sugar water. He must have been extremely hungry at that time.

He had the freedom of my room and seemed to enjoy being in his cage and in the flowers in the vase. I changed the flowers every few days to keep a supply of dew, etc. It was sweet to watch him eat from his cups and see his little red tongue dart quickly into the liquids. Often he would lick sweet water from my finger and then climb on my shoulder and look about as if he were on a tall lookout. Then he would ruffle his wings, look about and go. As he woke me every morning by the hum of his wings, I named him "Hummer".

About two weeks later I thought I should see if he wished to leave, so I took him into the yard and set him in the palm of my hand. It was hard to hold back a stream of tears; for after two weeks of watching Hummer get stronger and stronger I had grown quite fond of him. Then the big moment came. Hummer ruffled his feathers, looked about and darted off. He made a large circle and landed on my shoulder. I slowly returned to the porch to be sure he did not want to change his mind and fly away. He went back to my room with me and flew to his cage.

Two weeks after that I thought he ought to be made to go so I opened the window, set out jars of sweet water, maple syrup, and honey and set Hummer on the outer sill. He had his fill and flew away. The next morning I heard a shrill whistle on my window sill. I opened the window and who was there but Hummer. He came in and as he had his lunch on the sill, he was not hungry. I hope to see him this summer though I suppose I won't.

I hope you enjoyed this story, Mr. Carpenter. And I want to tell you I enjoy your science broadcasts.

Sincerely yours,
(Signed) Gertrude White

New Type Dime Bank

Ranger John Bingaman, writing in the July issue of *Yosemite Nature Notes,* reports an unusual find in the nest of a Streator wood rat, commonly known as a pack or trade rat. The nest was found to be composed of more or less alternate layers of leaves, needles and sticks, and then a layer of dimes. Altogether, 118 dimes were found in several distinct layers. Ranger Bingaman admits he is unable to explain the rat's preference for coins of one denomination, but says a possible explanation is that one of the Park Hotel waitresses placed all her dime tips in some open container from which the pack rat helped itself.

Trap Contest Results

A trap powerful enough to hold a coyote or a wolf that can be sprung on a naked finger without injury is one achievement of this year's humane trap contest sponsored by the American Humane Association. The feature of this winning trap is the use of a pliable chain grip that replaces inflexible steel jaws now in use. The award for this trap, $100, went to D. Ralph Knapp of Plattsburg, N. Y., for the second consecutive year. His entry showed substantial improvement over last year, being smaller, lighter in weight, better constructed and easier to manufacture. Other contest winners included D. A. Epp of Henderson, Neb.; Vernon Bailey of Washington, D. C.; Charles D. Briddle, Inc., of Christfield, Md., and Philip Wenger of Bern, Kansas. Edward A. Preble, John J. Slautterback and Dr. Ned Dearborn were the contest judges.

New York Park Guide

A guide to the State Park System of New York has been prepared by the State Conservation Department, and complete information about any one of the seventy parks that stretch from the shores of Lake Erie to Long Island can be had by prospective New York vacationers. The booklet contains maps, a hotel guide and lists the principal attractions of each park area and can be obtained from the State Council of Parks, State Office Building, Albany, N. Y.

New Nature Trail

John Bryan State Park, Ohio, boasts a new Nature trail, the work of C.C.C. enrollees. The trail, winding through the picturesque gorge of the Little Miami River, is interesting from a historical standpoint in that it once was a part of the old Pittsburgh-Cincinnati stage coach route.

Diana Hope's

DOG COLUMN

THE SETTER as we know him today is, comparatively speaking, a recent entry for show and bench honors as a developed and standard type. Bred from the field spaniel (by all accounts) about the middle of the last century, with a view to giving the hunter a hardier, tougher dog for a long day's sport, he has been steadily improved in the past eight decades into one of the most beautiful and graceful dogs to be seen on the bench or in action.

With the retriever and the pointer, he now bears the brunt of the heavy and exhausting work in the field. The little spaniel, who previously was a sort of man-of-all-work, a general-utility dog to the gun, from and before Chaucer's time, now takes the place, as it were, of a second-footman in the field. Nevertheless he is as invaluable today as ever in penetrating the thicker cover and brush and thorn-tangle, particularly on marsh lands.

There are three varieties of the setter: the Gordon, the Irish and the English. The latter breed is probably the most admired and desired of the three today. He has his own style of beauty; white-coated with black spotting; often with a black ear. His greater popularity would seem to back the vaudeville jest that "gentlemen prefer blondes", but, as a fact, white stands out in the underbrush amid the prevalent russet tones of the fall, hence the hunter is less likely to shoot his own dog. For *some* prejudices (not many) one is able to uncover a sound reason.

The Irishman's beauty of line is enhanced by the color and the sheen of his dress; a color and texture unmatched in all dogdom. The burnt sienna and satin finish of his coat, however, is not always a source of satisfaction or pleasure to the man with the gun, inasmuch as his dog is often indistinguishable among the foliage. Regrettable casualties sometimes occur in consequence.

In addition to an unsurpassed beauty, the Irish setter has an amiable disposition, an even temper and a happy nature.

The Gordon setter is a Scotsman whose very-great grandmother was a famous "setting" collie. Previous to the middle of the eighteenth century all setters" were described as "setting spaniels". The Gordon ranks, for no obvious or valid reason, somewhat behind his brethren in popularity. Black-coated with tan markings, he is heavier and is supposed to be slightly slower on the move, but the absurdity of this criticism lies in the fact that after five or six strenuous hours in the field the slowest dog will prove over-fast for the average sportsman! Even a gamekeeper spending the whole of his days in the open on his feet would tire first.

Just as the Pekinese is essentially a woman's dog, so is the beautiful and dignified setter a man's dog *par excellence*. The reasons for the favoritism by each sex are in both instances much the same.

Setters, in common with other field or "sporting" dogs, are, if one excepts the smaller spaniels, not easily adaptable to town life, nor can they be comfortable, happy, or healthy under city conditions.

The spaniel has probably inherited or acquired wisdom or a philosophy of acceptance that makes him more adaptable to conditions of existence wherein field-sports do not enter than is the setter, pointer or retriever; but this is not to say that under all possible adverse and unsuitable circumstances the setter is not a wholly delightful dog to have.

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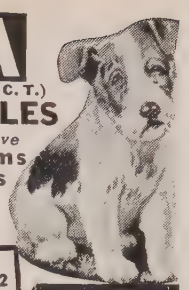

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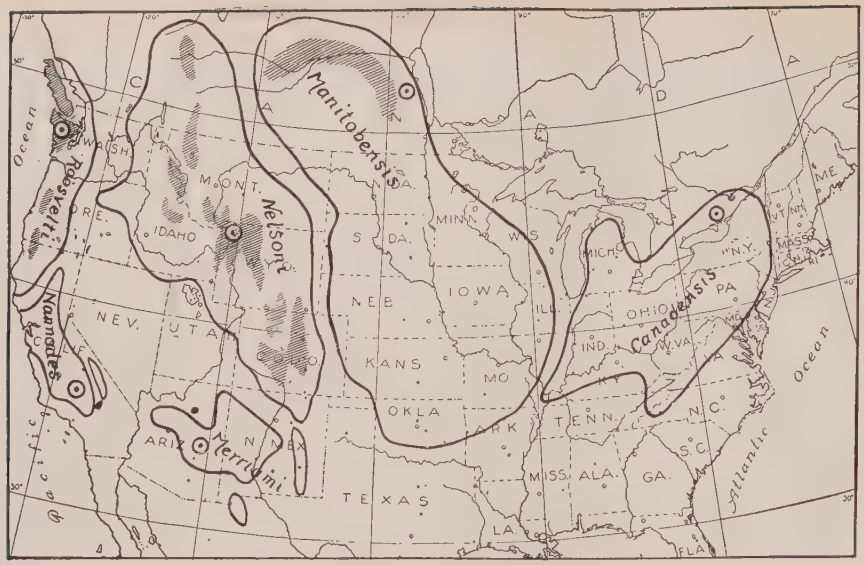

ORIGINAL RANGE

OUR NOBLEST DEER

(Continued from page 139)

pleasant and profitable to the elk herds as they covered a few hundred miles to grassy bottomlands and dense thickets along the river valleys, but this was long ago. Now they do well to get half-way down and in a mild winter the stronger animals live through, but in severe winters with deep snows many die of starvation.

Feeding hay and grain is a temporary makeshift that has saved the lives of thousands of elk, but it does not pay, it is not good for the elk, and in a bad winter there is never enough hay. All the elk want is the native vegetation, left where it grows so they can dig it out of the snow and browse on buds and twigs of the bushes and low branches for their natural winter food. This would require more land than would raise the hay to feed them, but they would get their natural food and have to work for a living instead of being pauperized on expensive hay that often contains destructive foxtail and other unwholesome elements.

Generally there is no scarcity of summer food and range for a reasonable number of elk as they can out-climb and out-travel domestic stock, but winter food is their great need. There is an abundance of public land suitably located for winter range for all of the elk now occupying the western States. The only problem is—shall enough of it be used for winter range for the elk, or shall all of it be given up to domestic stock? Some privately-owned ranch land in high valleys has been bought and turned over to the Biological Survey for elk hay land, but not enough to afford winter forage nor even enough to produce the winter hay required. There is no escaping the bare fact that there must be more winter food or fewer elk.

Now the elk problem is one of apportioning the right number of elk to definite areas where both summer and winter food are available in sufficient quantities to sustain permanently a definite number of animals. It is just as fatal to the food supply to overstock the range with elk as with domestic stock, for the carrying capacity of the range would soon be ruined by the over-grazing of either.

The coldest weather holds no terrors for these hardy animals with their thick winter coats if suitable food is available to keep their inner fires burning. But they do enjoy the shelter from storms afforded by dense thickets and evergreen groves or, in pleasant weather, the sunny side of a gulch or the south slope of some dry ridge. The type of country to be selected for them is of vital importance, though it may well be the roughest and poorest of range for other stock.

Only through definite plans for wildlife management can we hope to save a worthy remnant of our wild heritage. Many of our smaller forms of game can be maintained even among the farms and settlements without harm to any industry and with advantage to the land owners as well as to the sportsmen and people at large. Many other beautiful, interesting and useful species may be encouraged in the midst of populous areas. But such noble animals as the buffalo, moose and elk can never safely range at large among settlements of people, and if maintained at all must be given suitable habitat.

Fortunately, the diversity of country across the continent affords great areas unsuited to cultivation but well adapted to the production of forests and game in abundance and, still more fortunately, we are awakening to the necessity of making definite plans for such maintenance. Administrators, naturalists, sportsmen and the people at large are joining forces in a common cause of far-reaching education that if carried out will surely perpetuate far into the future the elk and other forms of wildlife. If this fails, our civilization will pass on a stigma of selfishness, neglect and inefficiency unworthy of the aims and standards for which, as a nation, we should strive.

Subspecies of North American Elk

There seems to be no question as to the continuity of the original range of all of the North American varieties of elk, although the Roosevelt, Merriam and dwarf elk may have met other forms only in migration. The differences are slight and of a superficial nature, such as are generally shown by a wide ranging and plastic species, adjusting itself through a long period to varied environmental influences. It is noteworthy that the few recognized forms of North American elk fit into geographic areas of well marked climatic differences that are clearly reflected in the characters distinguishing the forms. Possibly other variations might have been recognized from Kentucky and Oklahoma if specimens had been saved 100 years ago from these areas, but it is now too late and the safest method seems to be to include these areas under the forms associated with similar types of country.

The following brief key to the six recognized forms or subspecies of North American elk is necessary for the better understanding of the accompanying map. The relationship with Old World species and subspecies must be left for a complete study of this great holarctic group.

Canadian Elk or Wapiti

Cervus canadensis canadensis Erxleben, 1776.

Type locality, near Montreal, Canada.

Apparently not so large as the Rocky Mountain and Olympic forms, but as shown and described by Audubon and Bachman from eastern Pennsylvania animals, brighter brown and more richly colored than any of the western forms.

Became extinct about 1867.

Manitoba Elk or Wapiti

Cervus canadensis manitobensis Millais, 1915.

Type locality: Manitoba and eastern Saskatchewan.

Apparently larger and duller colored than typical *canadensis*; not so large or light colored as *nelsoni* of the Rocky Mountains. In summer rich chestnut brown, darker on head and neck and belly; in winter somewhat lighter.

A few thousand remain in good condition in western Manitoba and eastern Saskatchewan.

Rocky Mountain Elk or Wapiti

Cervus canadensis nelsoni Bailey, 1935.

Type from Yellowstone National Park. Sent alive to National Zoological Park from Gardiner, Montana, in 1904.

Size very large, antlers long and generally slender. Color in summer yellowish buff over body; head, neck and belly brown; in winter body buffy gray; head, neck, belly and legs brown.

Still abundant locally over a wide range in the Rocky Mountains. Introduced in many states, mainly in the West.

Roosevelt Elk or Wapiti

Cervus canadensis roosevelti Merriam, 1897.

Type from Mount Elaine, Olympic Mountains, Washington.

Size very large, apparently the largest of all the elk; antlers thick and often flattened or cupped toward the ends. Color in summer, body rich cinnamon buff; head, neck and belly dark brown with much black, in winter body dark gray with dusky dorsal stripe and dusky on face and mane and belly.

Still a few thousand in the Olympic Mountains and Vancouver Island, and a few hundred in western Oregon and northwestern California.

The name *Cervus occidentalis* (Hamilton Smith) is not considered tenable for any American elk.

Merriam Elk or Wapiti

Cervus canadensis merriami Nelson, 1902. *Type* from head of Black River, White ountains, Arizona.

Size about the same as the Rocky Moun- n elk, skull massive; antlers long and avy; color in summer, body yellowish own; head and neck and belly dark brown; winter body pale yellowish brown; head d neck and belly seal brown.

Became extinct about 1900.

Dwarf Elk or Wapiti

Cervus canadensis nannodes Merriam, 05.

Type from Button Willow, Kern County, lifornia.

Size smallest of the North American elk; llers light and simple. Color in winter, ly pale creamy buff; rump patch almost ite; head and neck light brown; belly and s tawny or pale cinnamon. Summer pelage seen.

A few still remain on the Button Willow nch, and about 54 have been removed to ens Valley, where 9 calves were reported June, 1933.

Jamestown Island Museum

A new archeological laboratory and reroom on Jamestown Island that will se the priceless relics being recovered that island by the National Park Service eing built by C.C.C. enrollees in Colonial tional Historical Park, Virginia. The lding, when completed, will also serve a temporary museum that will be open the public. The fruits of the painstak- archeological effort—drinking goblets, es, buttons, swords, cooking utensils, er, tools and weapons—are stored at estown for study, preservative treatment eventual museum exhibit, and reveal mate details of the lives of the colonists o founded the first permanent English lement in America.

Snakes Alive

The rich experiences of a man who has veled the world over studying snakes has n incorporated into an excellent volume h the above title. Their usefulness, senses intelligence, methods of locomotion, ir enemies and their defenses against n are described only as such a well- rmed student of snakes as Clifford H. e, the author, can describe them. Other resting chapters are devoted to snake s and their treatment, and keeping snakes pets. The final chapter discusses the sification of the major families of snakes he world, followed by an appendix con- ing a simplified key for identification North American species. Illustrated with ny fine photographs, *Snakes Alive* is ilable from the Viking Press, New York y, for $2.50.

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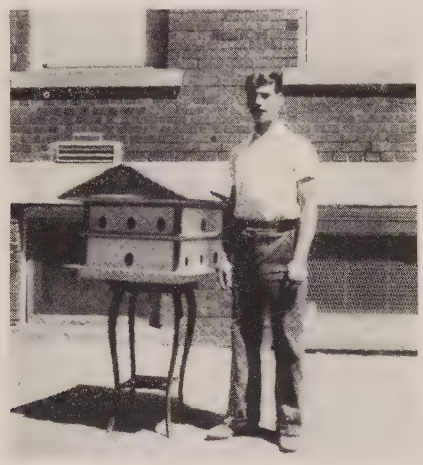
CONTEST WINNERS

Emadee Gregory of Lovington, Illinois, has been awarded first prize in the essay contest and Donald Oakleaf, of Niantic, Illinois, first prize in the bird house contest sponsored by the Illinois Federation of Women's Clubs, nineteenth district. The prize in each instance was a year's subscription to Nature Magazine. We are pleased to publish herewith both the winning essay and a picture of Mr. Oakleaf, aged 14, and his prize-winning martin house.



Why We Should Protect Our Native Birds

By Emadee Gregory

One who is a friend to birds will hardly believe that among the first laws passed in the colonies were bounty laws, offering awards for killing certain birds and fixing fines upon farmers who did not kill their quota of birds each year.

Little did they realize that, next to the domestic animals which supply material for foods and clothing, the birds are of the greatest economical value among members of the animal kingdom.

It is estimated that insects cost farmers two hundred million dollars each year, and that birds destroy those damaging insects and might be termed "Housekeepers for Nature". Since birds ask so little in return, it is tragic that we do not treat them any better.

Scientists who have observed and collected facts say that successful agriculture would not be possible without birds.

Each class of birds seems to have certain duties. Some rid the air of mosquitoes, gnats and such annoying insects. Swallows skim over shallow water, fields and marshes, purple martins circle over gardens, and night hawks and whip-poor-wills fly through the air for hours at a time eating insects. Others take care of tree foliage and plants, also the bark and roots of trees. Hawks and owls, considered destructive, do away with mice and rats. Birds are known as a volunteer health department. They do away with unhealthy garbage from the village alleys and also that which has been dumped into lakes from garbage cans.

Aside from destroying pests, birds are good for enjoyment, beauty, song, and for scattering flowers and plant seeds. Carrier pigeons carry messages.

Now that people are understanding better what birds do for us, we hope they will protect them and there will be dawning a happier life for the birds.

Rose-Colored Smoke

By Dorothy Jane Wentling

Fires to the right of us; fires to the left of us; fires behind us. We were surrounded by forest fires. Everything we ate or drank either smelled or tasted of smoke. In the mornings we could scarcely see the tops of the tall Norway pines, and our little lake was veiled in pungent wood smoke.

Wild animals, fleeing from their forest homes, often came quite close to the cabin. It was not a rarity to look out of the window and suddenly see a majestic antlered buck standing in the path beside the cabin.

Many bright-colored birds had assembled in our neighborhood, driven from their natural haunts by the impending danger. They fluttered nervously about, chattering to themselves. So many appeared that Harriet sat with her eyes glued to the field glasses, studying the many varieties as they fluttered restlessly among the trees close to the cabin. Their natural instinct seemed to warn them that something they could not comprehend was about to happen.

On this morning particularly, the smoke was more oppressive than usual. Breakfast was a dull affair, and there was a sense of anxiety in the air. Peg tried to lighten things by funny remarks, but her jokes fell flat, and she relapsed into silence, feeling that at least she had done her part.

I don't quite know how the day passed. At any moment we expected to receive news from the forest ranger to collect our most valuable possessions and prepare to flee.

With the evening came a slight breeze, and the smoke seemed to be lifting a little. Supper was a jollier meal than the two before it. Suddenly I dropped my fork and gasped, "Look! The sun! Oh, did you ever see anything so exquisite?"

"Come on," shouted Jack, and he left the table and fled down to the beach with the rest of the family trailing along behind him.

What a sight! I will never forget it if I live one hundred years. The sun had broken through the haze of smoke, and its rose-tinted rays bathed a path in pastel shades across the glassy surface of the lake. The smoke had made it seem more rosy than usual, and the water, with its delicate tinting, was a rare sight. This fantasy of color, however, did not last long. Nimbus clouds, lowering and black, were closing in on us. Even as we were returning to the cabin, I felt a drop of water on my cheek, and another on my arm. It was raining! Thus our day of worry and anxiety came to a close, with a picture no artist could paint.

Gangster Blue Jays

By Mrs. H. P. Magers

Wayland E. Mills in his *Why Harm the Blue Jay,* of the June, 1936 issue, calls them "perfect ladies and gentlemen." In our garden they have been murderous little pests. Let me recount just one of the many instances where this has been proved.

Last summer a pair of the usually shy brown thrashers built a nest in the plum tree which shades the back door. A pair of jays tormented them all the time the nest was under construction. The eggs were but a few days old when we missed them one morning; the nest was empty, with egg shells on the ground under it.

We thought the thrashers had left, when one day as I picked sprays of honeysuckle from the fence, I almost put my hand on th bird sitting on her eggs. She never move but watched me closely as I slipped away quickly as possible. We thought surely the would escape from the blue jays there, f she and the nest were so well hidden tha unless one parted the leaves directly ov her, they could not be seen.

The thrashers were secretive about th nest, too; the male did his serenading from tree in a far part of the garden. Every afte noon as I sewed or read on the screen porc I would see his mate leave or return to h nest. She did it quite cunningly. Instead coming through the leaves, she would sli out of the nest and drop down from stem stem until she was several feet away, alwa on the other side of the fence from the nes then she would run along the fence for yard or more before she took flight. Whe she returned she followed the same indire route.

One afternoon I missed her and agai found the nest empty, shells scattered as b fore. It seemed that the birds were gone f good then, but not so. In a short time the were back in their original plum tree, buil ing within a few feet of the first nest. I spite of all we could do to drive them awa the jays destroyed that nest, also. That w the last we saw of the brown thrashers th summer, and I suppose they were too di couraged to try to build a fourth nest.

No indeed! The blue jays have no frien in our garden, in spite of their beauty. The probably do some good destroying insec and weed seed, as all birds do, but that far outbalanced by their quarrelsome, nois voices and their wicked dispositions. The are the gangsters of the small-bird company let us treat them as such.

Motorists, Spare the Wildlife!

The National Park Service is seeking th cooperation of motorists in avoiding th needless slaughter of animals that is moun ing in direct ratio to increased travel b automobile. "Cross Crossings Cautiously means nothing to the wild things in ou National Parks and Monuments, it is poin ed out, and the slow, careful driver wi not only avoid unnecessary accidents bu will see new beauties undisclosed to th motorist who is always in a hurry.

For Poison Ivy

A reader in New Haven, Connecticu Miss Jean Paton, writes us her experience i treating poison ivy poisoning in the hop that it may benefit others. She says she a peared to be in for "a very promising siege and her usual prescription of laundry soa was not available. At the suggestion of som children she tried painting the welts wit iodine. The sting went immediately, elimin ating the tendency to scratch and spread th infection. One or two applications and th welts went down. Anyway, Miss Paton say it worked wonders for her.

Wildlife at Mount Rainier

Pacific beaver are one of the features o interest at Longmire, one of the principa camping areas in Mount Rainier Nationa Park, Washington. Their dam and lodg have been enlarged and the animals them selves may often be seen in the evenings b visitors to this popular mountain park. Con also are seen in the vicinity of Longmire.

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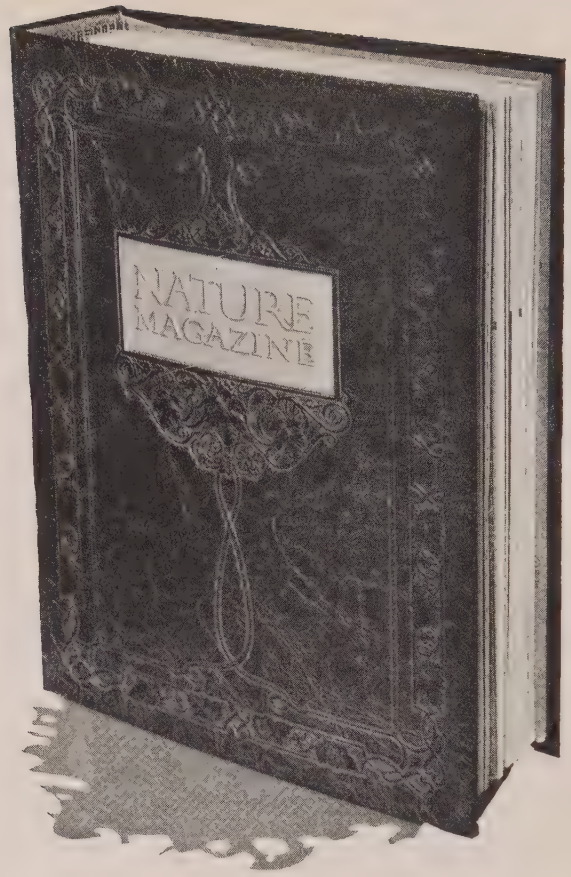

nere's the latest copy of Nature Magazine?" How often have heard that question! And how often an answer like "Look on the chair . . . over in the corner!" Like as not, much desired copy will turn up under the cushion in the dow seat. And great will be the lament at torn pages and sed pictures.

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BULBS FROM SPRING TO FALL

(Continued from page 174)

cially the singles. The doubles are not as satisfactory since their short stems do not keep them above the splash of mud.

Every one knows and enjoys the Darwin tulips. Some prefer planting them in patches of one variety—others prefer the mosaic of a mixture. Both types of planting are excellent if we will mass them in groups of twelve or more rather than planting them in a single row along the edge of a bed.

The new "Ideal" tulips give us a new range of colors, a new shape of flower, and the price is coming down to the point where we can all afford to have them. The old parrot tulips, with their floppy flowers and weak stems, are now replaced by the new "fantasy" varieties and others. You will like them. The Breeder tulip gives us a different range of color from the Darwins, but blooms at the same time as do the cottage tulips with their long slender buds.

About the same time another of the squills, *Scilla nutans,* comes into bloom, resembling a loose flowered hyacinth. Its white, pink or blue flowers give it a wide variety of uses in all parts of the garden, sun or shade, where they usually multiply. They are equally desirable as cut flowers.

And so, on to the lilies. They are a story in themselves, with most of us knowing but a few of the common ones. Why not look up one of the books on lilies such as Mrs. Fox's *Garden Cinderellas,* Isabella Preston's *Garden Lilies,* or Marshall's *Consider the Lilies.* You will immediately start looking for places to plant them. Many lilies are easy to grow; a few, like the Madonna, may be easy though it is not always so. Some, like *Lilium speciosum* and *auratum,* give excellent results for a season or so, but often disappear.

Among the most reliable are *L. elegans, L. umbellatum,* and *L. tigrinum.* They will grow anywhere and multiply. Others you should have no difficulty with are *L. regale, L. hansoni, L. henryi, L. concolor,* and *L. superbum.* But try them out for yourself, being sure to follow the instructions as to depth of planting and drainage. They vary in their requirements, depending on the variety. Incidentally, many prefer to get native grown bulbs with roots rather than Japanese grown ones. This is not always possible, however.

Lilies will give us blooms averaging two weeks apiece from early June to September.

For additional summer bloom you can use any of the tender bulbs discussed in NATURE MAGAZINE last month, including summer hyacinth, hardy amaryllis, *Zephranthes, Tigridia, Montbretia* and others.

For late summer bloom nothing is nicer than the hardy begonia, *Begonia evansiana.*

And finally we will finish the season with our late planted gladiolus, which, if planted in late June, will bloom during late September until frosts kill them. Although sometimes a gamble, it is one well worth taking.

One point we have not considered is the necessity of using all the spring flowering bulbs in connection with some other planting since their own foliage dies down and disappears by July 1.

The lilies, on the other hand, keep their foliage throughout the season, although with the exception of a few varieties, it is seldom sufficient to make an attractive effect. The various daylilies, *Hemerocallis,* especially the new summer flowering varieties such as Baystate, Hyperion, Crawford, Sir Michael Foster, Ophir and others make an excellent combination with the hardy lilies.

If you would delve further into the field of bulbs you will enjoy Mrs. Louise Beebe Wilder's latest book *Adventures with Hardy Bulbs.*

The new crop of bulb catalogs is out. Start perusing them now so you can place your bulb order for early fall delivery.

An Able Seaman Knows the Ropes

By Fred L. Blaisdell

A big herring gull and a crow recently staged an interesting aerial battle, to which I was a witness. The scene was a large slough where I was watching a varied collection of birds as they were feeding or sunning themselves. My attention was called to a large gull that was flying about in an odd manner. A second glance revealed that the gull was being chased by a crow. The flight of the gull was not panicky; quite plainly, here was an able seaman who, while fully able to take care of himself, desired to give way somewhat rather than engage in a brawl with a landlubber.

For some reason the other crows present took no part in the quarrel. Possibly the crow was just "showing off" for the benefit of his friends. However, as the gull flapped his way back and forth across the slough, the crow kept diving at him from above as is the custom with crows in combat. At each attack the gull, with just the slightest tilt of his wings, dodged and caused the crow to miss his mark. When the gull finally lost his temper, after some five minutes of patient effort to avoid trouble, the finishing blow was delivered with the finesse of a master swordsman's riposte. As the crow dived at his head, the gull checked himself with a flick of his wings so that the crow came up in front of him instead of passing to one side as formerly. Then, with lightning wing-stroke, the gull shot forward, dealing his adversary a vicious blow with his heavy beak. It was a mighty thrust delivered with perfect timing.

Taken completely by surprise and half stunned by the blow, the crow tumbled nearly to the water level before he recovered his wits and flew off, screaming loudly as do all rogues when they get their just deserts. The gull, evidently feeling that the landlubber upstart had been properly rebuked, complacently settled down among his fellows and began picking at some tidbit that he fancied.

Flower Show

The 1937 flower show of the Inglewood, California, Dahlia and Floral Society will be held in the local high school gymnasium August 27 and 28. The chief attraction of the show will be the contest between the "big ten" commercial dahlia growers of Los Angeles County competing for the Victor Trophy offered by the Inglewood Junior Chamber of Commerce, sponsors of the show. The show is unique in that no fees are charged the exhibitors and no admission is asked from the spectators.

Fire in Tennessee

Those who live in the mountainous regic of eastern Tennessee have seen the destri tion wrought by the forest's great ene —fire. Miss Dutsie Wood, a naturalist Altamont, Tennessee, last year experienc such a catastrophe and was moved to put words the thoughts that came to her as t fire threatened to destroy her home:

God Reclaims His Own

Dry, hot winds in August;
Parched leaves and dry streams;
The smoke cloud of a forest fire;
Birds restless in the trees.
Fox, deer and opposum hurrying ahead;
The dry crackle of a forest fire;
Destruction, desolation and ruin—
Homes destroyed, life recklessly spent,
As the Devil with fire and drought
Leaves this hillside like a desolate life.

Cool refreshing rains;
Streams full and bubbling as in prayer;
Birds as the beauties of life pass over.
The first hoary frost—
The leaves a bright color,
Ice on "The still waters,"
God sends His infinite glory—the snow,
And with the reviving rains of April
Reclaims with His green
The desolation, destruction and oblivion
Wrought by the Devil.

A Sunset

Since it is a very common thing, I'm afra people don't appreciate the stores of gra deur, inspiration, and beauty that one c realize from a sunset.

Imagine yourself standing on the sumr of a hill with a lake stretched out below a mountains surrounding you. As you face t west you watch the sun, a huge globe blazing glory, dip behind the distant peal the shadows creep stealthily nearer you, a now the lake is just a shimmering pool silver. Again your gaze recedes to the dist peaks; as you watch they seem to burst ir flame in a magnificent display of gloric color and triumph. A sensation of awe a wonderment grips your soul as if you ha just had a glimpse of God himself showi you creation. But, wait, it is dark now; y continue to stare at the fading tints of gc and fire and at last they, too, disappe Something arouses you from your meditati and you realize once more that you are part of the earth, and that, oh—just anotl sunset. But in every person's life there a only a limited number of sunsets, and I b lieve it would be well worth your while appreciate them.

B. H.

Film Strips

The Department of Agriculture aga offers film strips to teachers and extensi workers for the same prices as were effect last year—fifty cents to $1.10—d pending upon the number of illustratio in the series. The films are available on su subjects as farm crops, dairying, farm ar mals, farm forestry, plant and animal di eases and pests, roads, farm economics, far engineering, soil conservation, home ec nomics and adult and junior extension wor A list of available film strips and instru tions on how to purchase them may b obtained by writing to the Division Cooperative Extension, U. S. Department Agriculture, Washington, D. C.

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"Where's the latest copy of Nature Magazine?" How often you have heard that question! And how often an answer like this: "Look on the chair . . . over in the corner!" Like as not, the much desired copy will turn up under the cushion in the window seat. And great will be the lament at torn pages and creased pictures.

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Photographic Notes

BY SAMUEL BROWN

Autumn Pictures

With the warm days of summer past and the refreshing autumn days with us, we find that Nature has donned a new cloak. The leaves are slowly turning red and brown, the clouds stand out against a brilliant blue sky, the squirrels are running back and forth gathering their winter's supply of nuts, birds are flying south, cocoons are being spun and numberless other things are taking place on all sides. This autumn is going to be a busy one for the hunter with the camera.

The amateur photographer's first thought as autumn approaches is the beautiful scenery found almost everywhere. The country roads, the trees, mountains and, for the city dweller, the parks, are most attractive subjects. In order to preserve with some faithfulness the values of a colorful subject, it is necessary to use a panchromatic film. Two or three filters will prove useful in order to get correct renditions and give contrast for unusual effects.

Careful attention should be given to composition or the pleasing arrangements of the different elements in the scenic. It is generally found that in the enthusiasm of making a picture too much is included, resulting in confusion. It is therefore necessary to select the necessary elements and either leave out or subdue the unimportant ones by a change of point of view, tilting the camera up or down or moving it left or right or throwing them out of focus by using a larger diaphragm opening. Be as simple as possible and have only one important point of interest with all others subordinating but supporting it. There are times when it is not always possible to select only the important object. When this is so, merely photograph whatever is necessary and then trim the finished enlargement to conform with the original idea.

COUNTRY ROADS MAKE CHARMING SUBJECTS, PARTICULARLY IN AUTUMN. TAKEN ON PANATOMIC FILM WITH ORTHOCOLOR #2 FILTER, 1/25 SECOND, F.8

Never divide a picture in half by a definite line such as the horizon. If there is such a line, be sure that it is always either above or below the center and that the portion to which is given the most prominence is interesting. If the sky is the most important, there should be either clouds or a flock of birds. If the foreground is to hold the attention it should have a tree or some other object of real interest. Also, whenever possible, lines of any kind should be curved as these are more beautiful than straight ones.

Point of view is an important factor in composition. A low point of view adds height to an upright object while a higher point of view would make it seem dwarfed. Roadways and brooks should be taken at an angle leading the eye into the center of the picture. Do not have it run straight through because it may lead the eye right out of the picture again.

For interesting pictures, the elements composing it should balance one another. For example, a prominent object such as a tree on one side might well be balanced on the other by a clump of bushes. Always remember also that the weakest part of the picture area is the center. The principal object should occupy a position a little to one side and slightly above or below the center. Clouds always add a pictorial note and should be included whenever possible. Where they are to assist the composition a green or yellow filter should be used while if they are the most important thing the red filter should be used to render them strongly against a dark sky.

Lighting is an important factor. In black and white photography it is shadows that give roundness and a stereoscopic effect to the picture and make objects stand out from their surroundings. As a rule, shadows should have some detail and this may be secured by rather full exposure. The old rule of having the sun at the back when making pictures is no longer true. Always have the sun strike at some angle so that the shadows are preserved to a degree. Interesting effects are possible with a low sun casting long shadows. This is especially desirable for autumn scenes. For a particularly odd effect, shooting into the sun with a short exposure will give the appearance of a moonlight scene. When experimenting with light in this manner it is necessary to have a sunshade for the camera so that the sun will not strike the lens except where it is deliberately directed at the sun. When shooting against the light where detail is required in the shadows, a longer than normal exposure will be required.

It is sometimes advisable to include a person in your picture. This often is a help to the composition and gives a sense of proportion to the scene. Some pictures will give an appearance of animation if the person is engaged in feeding an animal or some other action.

With Nature bedecked in her most beautiful raiment, the photographer has an opportunity to make the most beautiful pictures of the year.

* * *

Exposure

The basis for every good picture is a good negative. There are two factors that determine the quality of a negative: exposure and development. Since exposure occurs first, we shall consider that in this discussion.

AN UNUSUAL OCTOBER SUBJECT TAKEN IN EARLY MORNING ON VERICHROME FILM, 1/25 SECOND, F.8

Exposure is a complex problem since so many elements enter into it. The subject itself, its color, and its distance from the camera are important. Light subjects, such as marine and beach scenes that are photographed over great distances, require less exposure because of their great reflective power. Ordinary landscapes, because of the abundance of sky, also reflect a good deal of light but require somewhat more exposure than seascapes. Nearby landscapes such as architectural subjects, street scenes and large groups require still more exposure because there is little or no sky showing and the subjects are closer, requiring a finer rendition of detail. Close-ups, such as portraits, flowers and pets, require the longest exposures.

The next question to consider is the proper stop and shutter speed for each picture. As a rule, it is best to decide on the shutter speed required. If the subject is inanimate, this is unimportant as the camera may be set up on a tripod or some other firm support and a long exposure given with a small stop for the greatest depth of focus. However, in photographing people there is always some danger of motion, and this is also true of the photographer himself. It is difficult to hold the camera in the hand steady for longer than 1/25th of a second and many persons find that 1/50th of a second is the limit. With a miniature camera, faster shutter speeds are still more important since the lightest motion will be considerably magnified in the enlargement. Therefore, taking into consideration the subject, steadiness of the photographer and type of camera, the best possible exposure is determined and the lens set accordingly.

Another factor in exposure is the time of the year and time of day. During the summer, of course, the light is stronger and exposures are generally less. The middle part

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of the day is also stronger in actinic power than earlier and later hours.

The weather consideration comes next. On clear days with the sun shining directly on the subject, the exposure required is very short. With slight clouds overhead a little more exposure will be required. When there are enough clouds to prevent the sun from casting a shadow, a longer shutter speed will be required and on dull days or in the rain, if the camera is used, a comparatively long exposure will be necessary.

Box and single lens cameras should be used at their fullest opening in good light and a snapshot given. With fairly fast film, a snapshot may be made in fairly dull weather while a short time exposure will be required on very dull days. On the beach, the smaller stop should be used except when taking close-ups. If in doubt as to the proper exposure it is a good rule to remember that slight overexposure is to be preferred to underexposure.

* * *

Trade Hints and New Books

Copies of any of the following interesting and helpful booklets announced in past departments are still available. Send a three-cent stamp for any one you wish. The booklets are:

Modern Developing Technique, Lantern Slides, See America with a Graflex, Capturing the Jungle with Camera and Spear, Kodak, Graflex and Graphic Focal Plane Shutter Photography, Controlled Lighting and How to Snap Pictures Indoors.

* * *

Tourists to Italy have been disappointed because they were not permitted to make Kodachrome pictures due to a regulation that requires all pictures be inspected by the authorities. However, an arrangement has now been made whereby such pictures may be exposed and inspected by the Italian consul in this country. Full information may be secured on application to the Italian Tourist Information Office, Rockefeller Center, 626 Fifth Ave., New York, N. Y.

* * *

The Miniature Camera by George W. Hesse, Fomo Publishing Co., Canton, Ohio. Price 50c.

Mr. Hesse is well qualified to write a book on miniature cameras since he is in daily contact with amateur cameramen from all over the country. His book is designed to help the amateur choose and use a miniature camera. His suggestions are plainly helpful, discussing impartially all of the miniature cameras available today. General hints, selection of film and many other problems of miniature cameras are thoroughly discussed. Anyone puzzled as to what camera he should get will find this little book a worthwhile investment.

(Continued on page 197)

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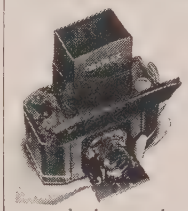

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HENRY HERBERT
483 Fifth Avenue, New York City

A Rare Experience

Editor, Nature Magazine:

I often read of strange actions of animals and birds, and I now wish to relate a most peculiar incident that occurred a week ago while I was fishing on a lake in New Jersey.

I was surprised to see a fine specimen of Red Admiral butterfly, *Pyrameis atalanta,* while I was out some distance on the lake, which circled about my boat, and finally lit on my knee. However, finding no satisfaction or nourishment in the cloth of my trousers, it finally flew to my wrist. I was very much thrilled to see this beautiful butterfly right on my wrist and feared that any moment it might fly away upon discovering its mistake; but to my surprise it seemed to be very tame and not at all mindful of the motion of my wrist or the approach of a finger from my other hand to within an inch of it, as it sat and enjoyed the salt from my perspiration. Occasionally it would fly off and make a little circle and alight on my wrist again. I then tired of sitting quietly and started to cast the fly, and to my surprise the butterfly still sat on my wrist on the hand with which I was using the rod. The motion did not seem to disturb it in the least. It sat around for a half hour or more, and when I finally rowed in to get my lunch at the Clubhouse it flew off to a clump of bushes some fifty feet away.

I said goodbye to the butterfly thinking I would see no more of it, but when an hour or so later I returned to resume my fishing (and there were several other boats of fishermen there) it flew out 100 feet on to the lake and again alighted on my wrist. I was so amused and astonished at this strangeness that I rowed in to show the butterfly to my wife in my cottage. I took it through the door to a rather dark room and there it sat on my wrist for inspection. Finally I thought I would give it a treat and hunted up some sugar, but when I attempted to induce it to take the sugar it flew from my wrist on to the wire screen. As I could not coax it back again, I opened the door and it disappeared.

It has been my lifelong experience that it is very difficult to approach a butterfly of any kind, much less to encourage such confidence as displayed by this unusual specimen. I feel sure this will be of interest to your readers as it has been to me.

Very truly yours,
C. B. Riker

Nature Club an Asset

The Lakeland Nature Study Club of Lakeland, Florida, now boasting of three seasons of successful existence, has entered upon its fourth year, confident of continuing its service to the community. The club, which has been a boon to tourists interested in the natural history of Florida, is a wide-awake organization that has sponsored Nature excursions to points of interest and has engaged prominent speakers to lecture on the State's wildlife. Mr. C. Russell Mason of Sanford, Florida, President of the Florida Audubon Society, will inaugurate the fall series of lectures. Those interested in the club's program should write to Miss Serena C. Bailey, Lakeland Public Library.

New Plants in the Smokies

Forty species of higher plants this year have been added to the compilation of a check list of flora of the Great Smoky Mountains National Park, and five of the specimens are new to flora lists of the Southeast, according to botanists' field reports received by the National Park Service at its Richmond, Virginia, regional headquarters.

Nearly 1100 species of seed-bearing plants are represented among the 4000 herbarium specimens collected, and scientists believe the botanical wonderland of the Smokies eventually will contribute a total of at least 1500. Among rare herbs embraced in the collections is the mountain ragwort, of which no scientific report is found anywhere else in the world.

Childs Frick Expedition

Part two of the report on the ornithological work of the Childs Frick expedition into eastern Africa has been published by the National Museum, Smithsonian Institution, and is available from the Superintendent of Documents, Washington, D. C., for 70 cents. Students and ornithologists interested in the many species of birds identified in Ethiopia and Kenya Colony by the expedition will find the volume invaluable. Herbert Friedman, Curator of Birds, U. S. National Museum, is the author of the work.

New Refuges Established

Executive orders have established the Turnbull Migratory Waterfowl Refuge of 12,774 acres in Spokane County, Washington, and the Apache Migratory Waterfowl Refuge, Apache National Forest, Arizona, comprising 2680 acres.

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PHOTOGRAPHIC NOTES

(Continued from page 195)

Home Movie Gadgets Any Amateur Can Make by William J. Shannon. Published by Moorfield and Shannon, Nutley, N. J.

The publishers of this book describe it as "a collection of interesting devices, gadgets and ciné-experiments for the home movie fan who has advanced beyond the grade of the 'animated snapshooter'" and its contents appear to prove this claim. Mr. Shannon, in addition to being an amateur motion picture producer in his own right, is well known to readers of this department by his many other contributions to the literature of ciné-photography.

The book carefully describes many gadgets made by amateurs such as miniature sets and how to make them, a simple title apparatus, home made flares and many more. If you own a movie camera and if you like to build things and experiment, this book will surely point the way.

* * *

The photographic department of NATURE MAGAZINE is devoted to its readers interested in photography and maintains a service which renders assistance with any photographic problems. You are invited to take advantage of this service. Address all photographic inquiries to Samuel Brown, NATURE MAGAZINE, 1214 Sixteenth St., N. W., Washington, D. C.

Cordially,
SAMUEL BROWN

* * *

Meet Our Authors

One of America's outstanding Nature writers, *Archibald Rutledge* this month reveals the interesting incidents he has observed while tramping the woods under October's "mad moon."

H. H. Pittman has made several trips to the plains of western Canada, studying the natural history of the region. There he found so much that was new and fascinating that today he spends most of his time on the prairie photographing and writing about the area's wildlife.

E. C. Hummel is a student of and an authority on cactuses, particularly of the exotic varieties that grow in the southwest and in Mexico.

Employed in the publicity department of the General Electric Company, Schenectady, New York, *Anna McNeil* often has marvelled at the natural wonders of nearby Saratoga Springs. Her article was written after an intensive study was made of the area.

Mary Carpenter Kelley is chairman of publicity for the Garden Club Federation of Maine, and expresses a wildflower conservation dogma in her article that might well be accepted by more people.

Ivan R. Tomkins, a native of Pennsylvania, has lived on or along the banks of the lower Savannah River, where he has had the opportunity of observing the interesting wildlife that ranges from the yellow waters of the old rice-field marshes through the brackish area and salt water marshes down to the beaches at the river's mouth.

Myron H. Avery, who was one of the moving forces in the development of the Appalachian Trail and is chairman of the Appalachian Trail Conference, is a member of the United States Maritime Commission.

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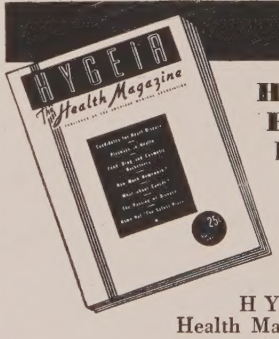

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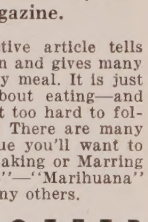

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In October—Bradford Torrey

By HOWARD ZAHNISER

A ROBIN once stood motionless on Boston Common, "every few seconds making a faint hissing noise". The bird's strange behaviour aroused the curiosity of a young office worker crossing the Common, a curiosity never satisfied but always cherished. The young man was Bradford Torrey. Twenty-five years ago he died, on October 7, 1912, two days before his sixty-ninth birthday; but he left behind a dozen books. It was a generous contribution that he made to readers, and one could wish that motionless hissing robins might often be noticed by young office workers hurrying through public parks.

Before the robin inspiration, Torrey had, as he said, been "often seen wandering . . . in out-of-the-way wood-paths, or sitting idly about on stone walls in lonesome pastures," but he "knew nothing of any open-air study." He had only high-school experience in formal education, had worked in a shoe factory, and had taught school. In Boston he worked in business houses and, for sixteen years, in the office of the American Board of Commissioners for Foreign Missions. His robin experience must have led to a call to what one might now consider important work in home missions, for with his aroused interest in birds he found that he could write. He even became an editor, leaving the missions board for the *Youth's Companion* in 1886 and staying there until 1901, when he apparently found that his own potential writings were more important to him than those of others. He devoted the rest of his life to his own literary pursuits, though these happily included the editing of Thoreau's journals.

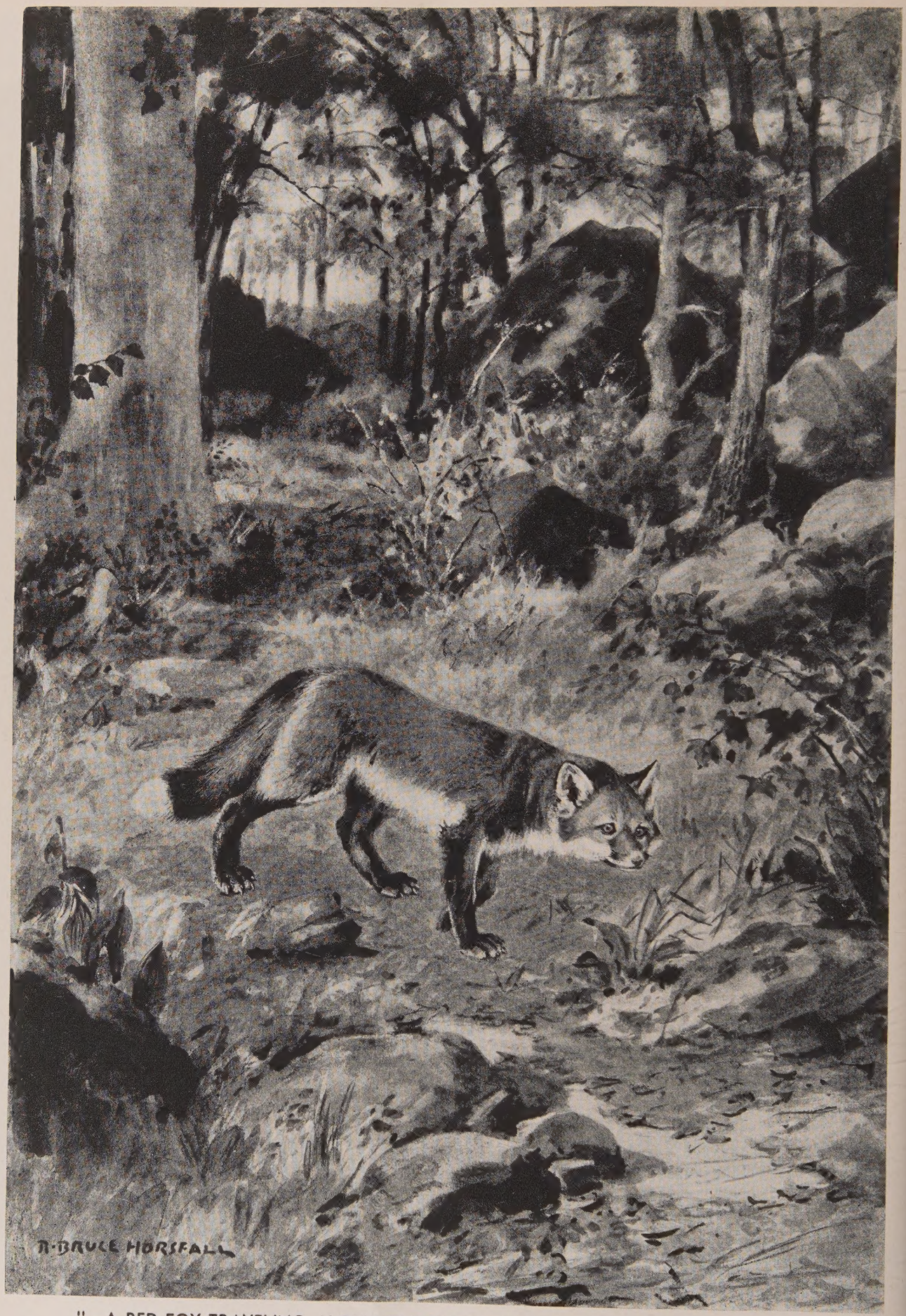
Bradford Torrey was a New Englander, but he traveled much and lived about the last five years of his life in California. His complete reader thus finds himself carried to Virginia, Tennessee, Georgia, Florida, Texas, Arizona, California, and other areas some distance from the New England mountains where the first books may guide him. *Birds in the Bush, A Rambler's Lease, The Foot-Path Way, A Florida Sketch-Book, Spring Notes from Tennessee, A World of Green Hills, Everyday Birds, Footing It in Franconia, The Clerk of the Woods, Nature's Invitation, Friends on the Shelf, Field-Days in California*—these are the titles, and of themselves they afford a taste of Bradford Torrey's writings, all but one about the out-of-doors and that one, *Friends on the Shelf*, containing the best discussion of Thoreau that has so far come the way of at least one reader.

As Torrey's travels give a geographic breadth to his books, so also his faithfulness in and out of season makes of his works a rather complete chronicle of the year—and, incidentally, one not limited to birds but rich in botanical observations and occasionally attentive to butterflies, though including few references to other creatures of the outdoors. Torrey quotes Thoreau, "I would know when in the year to expect certain thoughts and moods," and he facilitates such expectations by his own readers. *The Clerk of the Woods* has the minutes for Torrey's meetings with Nature during the whole round year. Chapter headings in other works guide one to the records of specific months and seasons, and in many other chapters also the reader soon finds himself enjoying observations with a seasonal unity.

For the most part Torrey's writings are the records of definite experiences which he wishes to share. "Rambler," "Foot-Path," "Footing It"—they are pedestrian, with pedestrian virtues in observation and often with pedestrian limitations in style. In one instance Torrey declared that his "business was not to be witty or wise, but simply to 'keep the records'." Well, there is in his works some witticism with much wisdom, but all in all there is a collection of well-written records. Torrey makes an excursion or takes a walk, and the reader may go along. On the way he will not be held for gushing expressions of enthusiasm. He will find a man who likes to recall quotations, especially from the Bible. He will find his guide taking frequent delight in putting new wine into old sayings—as on one October excursion, for instance, he may learn that "without being mown, the huckleberry bears a second crop—a crop of color. It is twice blest; it blesses him that eats and him that looks." But for the most part Torrey goes his pedestrian way, eloquently recording his observations as a "clerk" of the woods.

I like these twelve books and—possibly because of special intentness—I like especially their chronicles of October. Most of them I have just read for the first time, and, owing to a providence of eye-strain, I have heard a great deal of them read aloud, sensing as I otherwise might not have, their conversational quality. You will enjoy them, too, and I dare say you will be glad for once to find a well-written chronicle of the out-of-doors that leaves to you the bursts of enthusiasm. I give you a sample of one of Bradford Torrey's more enthusiastic descriptions:

"I have seldom been more charmed with the song of any bird than I was on the seventh of last October with that of . . . *Vireo solitarius*. The morning was bright and warm, but the birds had nearly all taken their departure, and the few that remained were silent. Suddenly the stillness was broken by a vireo note, and I said to myself with surprise, A red-eye? Listening again, however, I detected the solitary's inflection; and after a few moments the bird, in the most obliging manner, came directly towards me, and began to warble. . . . He sang and sang,—as if his song could have no ending,—and meanwhile was flitting from tree to tree, intent upon his breakfast. As far as I could discover, he was without company; and his music, too, seemed to be nothing more than an unpremeditated, half-unconscious talking to himself. Wonderfully sweet it was, and full of the happiest content. 'I listened till I had my fill,' and returned the favor, as best I could, by hoping that the little wayfarer's lightsome mood would not fail him, all the way to Guatemala and back again."



"—A RED FOX TRAVELING ALONG THROUGH THE WOODS IN FULL SUNLIGHT—"